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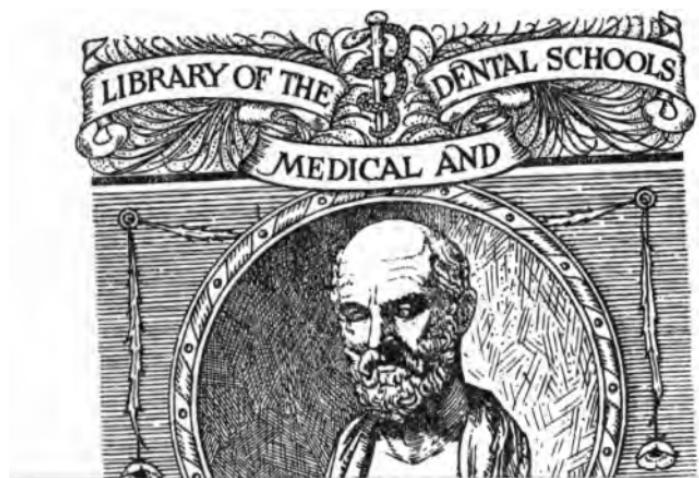
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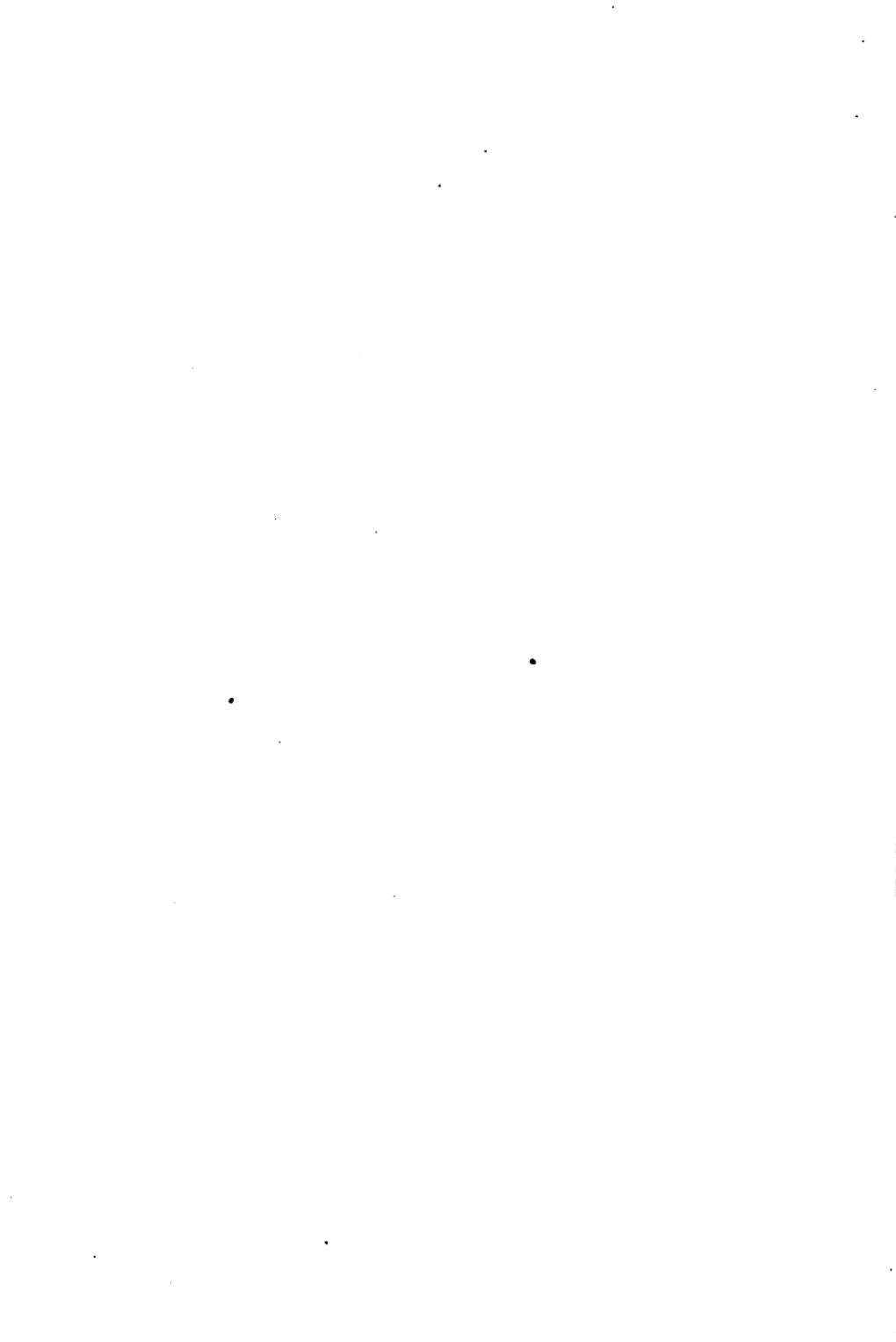
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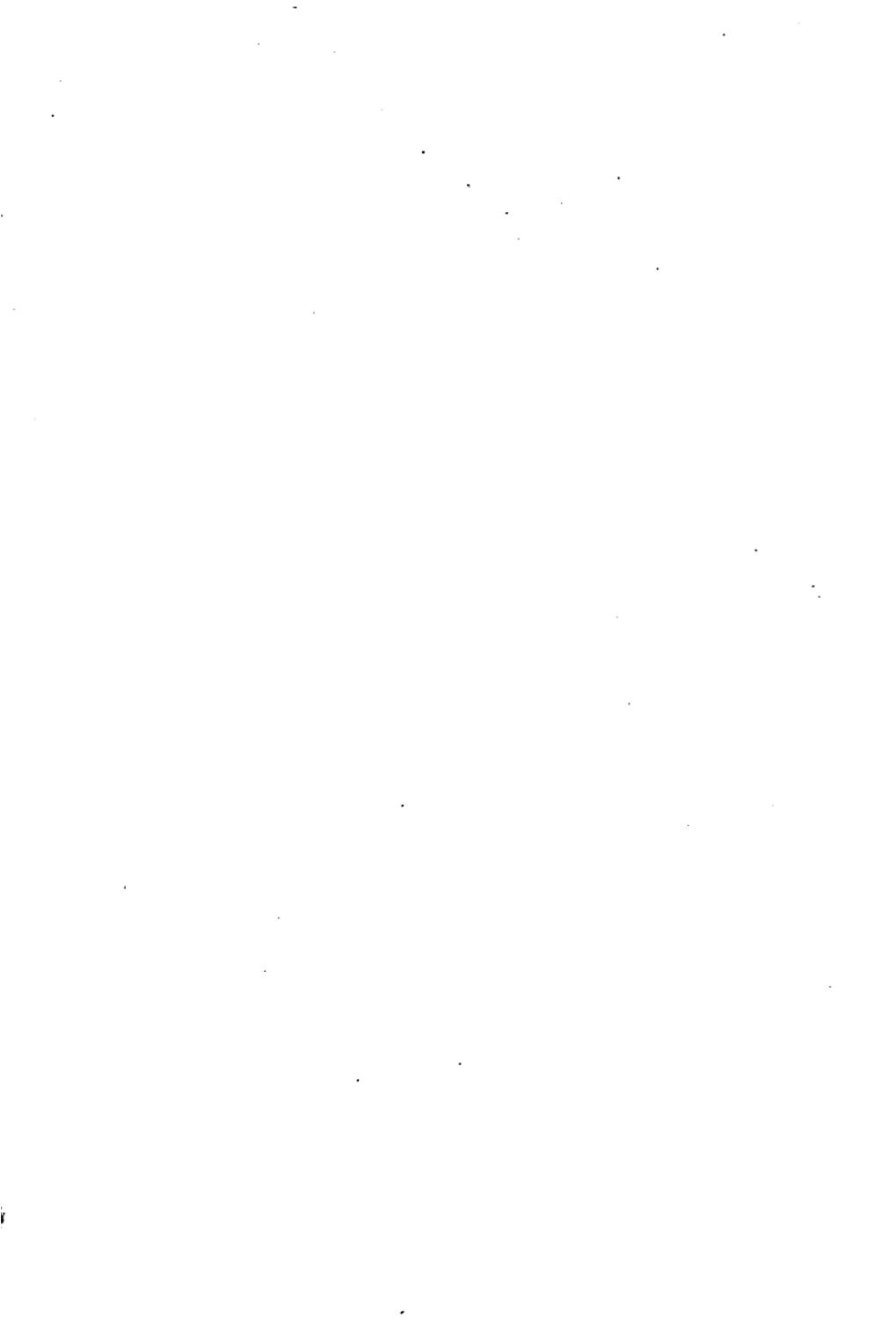
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Richard P. Faulkner, M.D.

The Topology of

the $\mathcal{O}_X(E)$ Sheaf

of Functions

Structure, Continuity
of the Topology, and
to Persistence

With Applications to
Unbiased Estimation

RICHARD D. FARNHAM
University of Texas

WITH A FOREWORD BY

PROFESSOR JAMES M.
BROWNE, JR., Ph.D.

UNIVERSITY OF TEXAS

AUSTIN, TEXAS



Richard P. Faulkner, M.D.

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What is the matter?

The Tonsils and The Voice IN Science, Surgery, Speech and Song

A COMPREHENSIVE MONOGRAPH

ON THE

Structure, Utility, Derangements and Treatment
of the Tonsils, and of their Relationship
to Perfect Tone Production

A RESEARCH STUDY

With Original Contributions from the
Highest Medical and Voice Authorities

BY

RICHARD B. FAULKNER, M.D.
(COLUMBIA UNIVERSITY)

WITH AN INTRODUCTION

BY

PROFESSOR GEORGE M. SLEETH
Instructor in Elocution, Western Theological Seminary

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RICHARD B. FAULKNER, M.D.



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NEW YORK

PREFACE

Tonsils! What are they? What are their functions? Who knows? What textbook tells?

I have made a research investigation, and this book gives the result. Lights and side-lights fell upon my path. Delicate, difficult, complex, technical questions of the voice arose. Two professions became involved.

No treatise on the tonsils is complete unless it includes the questions of the voice, for the tonsils and the voice are inseparable subjects.

This is the only work in which a systematic effort has been made to connect the viewpoints of both the medical and voice professions, in an orderly and authoritative manner.

This is the only work on the subject published in any language. This is the only work in which, in addition to its physiological functions, the tonsil is treated as a mechanical body, and the action of its mechanism fully expounded.

This work contains all the facts of a world's research on the structure, uses, disorders and treatment of the tonsils; many new facts in the science of the vocal art; and in addition, a full exposition of the modern hygiene of the tonsil, the hygiene of the voice, and the care and health of the nose, mouth and throat.

That "the voices of singers and public speakers are benefited by complete removal of the tonsils"; that "the loss of the tonsils may cause a

permanent loss of the singing voice is a puerile and senseless belief"; that "If the tonsil in a *normal* state is removed *in toto*, there is no disastrous after effect, but on the contrary, the individual is improved in health, and the richness in quality of voice and the volume of tone are increased one hundred per centum"; are common statements in the standard works of the American medical profession. These statements are important. Are they the truth? What is the answer of the voice profession?

I am gratified at the courteous contributions, and also with the expressions of regard for the importance of the work I have undertaken, which I have received from such distinguished medical and voice authorities as *Von Chiari* (Vienna), *Frankel* (Berlin), *Von Schrötter* (Vienna), *Brieger* (Breslau), *Von Levinstein* (Berlin), *Marage* (Paris), *Jacobi* (New York), *Escat* (Toulouse), *Moure* (Bordeaux), *Castex* (Paris), *Lermoyez* (Paris), *Sir Felix Semon* (London), *Beverley Robinson* (New York), *Von Gutzmann* (Berlin), *Gleitsmann* (New York), *Schmiegelow* (Copenhagen), *Van Baggen* (The Hague), *Lubet-Barbon* (Paris), *Luc* (Paris), *Natier* (Paris), *Helsmoortel* (Antwerp), *Loewenberg* (Berlin), *St. Clair Thomson* (London), *H. Holbrook Curtis* (New York), *Scripture* (New York), *Miller* (New York), *Raoult* (Nancy), *Zund-Burguet* (Paris), *Massei* (Naples), *Knight* (New York), *Barth* (Leipzig), *Holmes* (Boston), *Mackenzie* (Baltimore), *Gleason* (Philadelphia), *Cassellberry* (Chicago), *Ross* (Montreal), *Lamperti*

(Berlin), *Mme. Cappiani* (New York), *Mme. Mott* (New York), *De Reszke* (Paris), *Mme. Lehmann* (Berlin), *Sebastiani* (Naples), *Shakespeare* (London), *Sir Charles Santley* (London), *Sabatini* (Milan), *Mme. Patti* (Breckshire, Wales), *Mme. Nordica* (New York), *Mme. Schumann-Heink* (New York), *Mme. Tetrazzini* (New York), *Mme. Clara Kathleen Rogers* (Boston), *Bonci* (New York), *Bispham* (New York), *Curry* (Boston), and others.

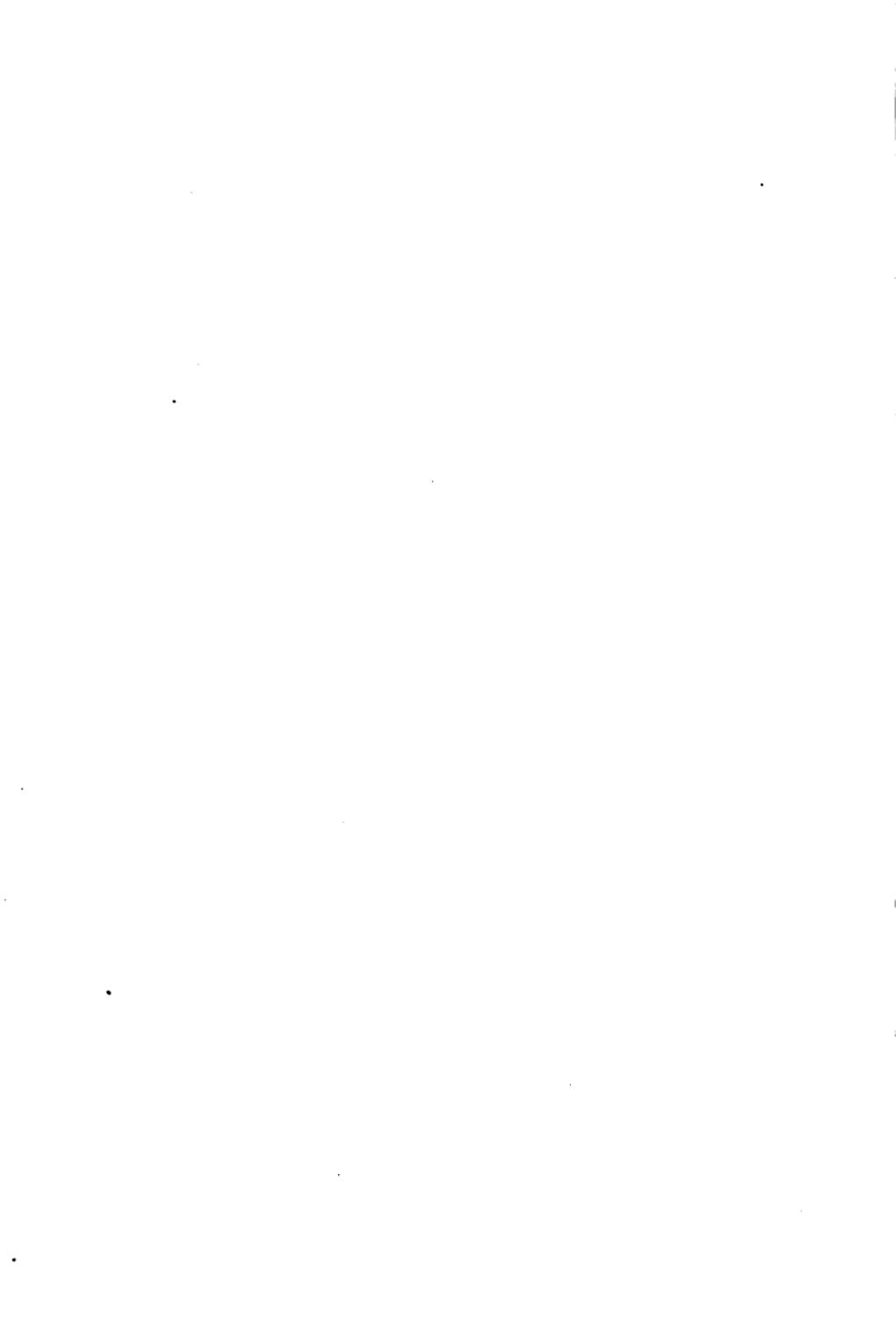
The object of this work is to present known facts, the latest views of the most eminent authorities, and the indications which denote safe lines of treatment as against the *apparent indiscriminate and reckless disregard of tonsillar function*.

The author will feel rewarded if his efforts please the expert laryngologists, and other interested members of his own profession, as well as the voice mechanicians, voice trainers and voice users.

My thanks are due to Dr. Kniffler (now of Wiesbaden), Mr. Charles H. Read, and Professor George M. Sleeth, for their valuable assistance in the preparation of this work.

RICHARD B. FAULKNER.

100 Fifth Avenue,
Pittsburgh, 1913.



INTRODUCTION

Dr. Richard Biddle Faulkner needs no introduction. He received the degree of Doctor in Medicine from the College of Physicians and Surgeons in the City of New York, Columbia University, and also received special instruction under Professors Alonzo Clark, Charles McBurney and John G. Curtis.

Many scientific contributions from his pen have appeared in the leading medical journals of America.

The starting point of the present treatise, the author says, was a question asked him by the writer of this introduction. Being a teacher of the voice and delivery for over thirty years in the same city with Dr. Faulkner, and having had occasion for many years to avail myself of his skill in laryngology, both for myself and my students, I one day asked the doctor, "What are the tonsils for?" This book is the answer. Behold how great a matter is kindled by how very small a fire! He started upon a new and thorough investigation. He has ransacked Europe and America to give us the answer. And he presents the testimony of those best qualified to speak on the matter.

The book contains contributions from world-renowned artists and teachers and scientific investigators.

Not the least interesting and profitable part of

the work is that which gives the most recent and authoritative treatment of the tonsils, and the great discoveries which have been made in the science of the voice, as regards its mechanism, its preservation, its use and its treatment.

As a result of the investigations, teachers of the voice, both in speech and song, will be more careful in recommending tonsil surgery as a panacea for voice users. The treatment of the vocal apparatus is a specialty. The ideal expert would be one who combined laryngological skill and a sound knowledge of the theory and practice of the voice.

Literature on the subject of the connection between the tonsils and the voice is scanty. And when reference is made to the subject, it is generally some wild surmise, or bare, unsupported dogmatism, or sheer tradition.

There is an originality of investigation and a freshness in the method of treatment of the subject, which renders this work unique. Specialists will be grateful to have so much information and such a gathering of famous opinion, in so compact and orderly a form.

GEORGE M. SLEETH.

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CHAPTER I

RESEARCH INVESTIGATION.

Research investigation lays bare, explains and connects the facts which form the foundation of every science.

Science is the knowledge of ascertained facts, arranged in orderly series, and referred to general truths and principles on which it is founded. Science is a record of truths. Science accepts no statement as one of fact, unless its truth can be proved from every possible point of view.

The man with facts is an authority. The man without facts is no authority. Every fact ascertained is a scientific asset, and adds one unit to the sum total of human knowledge. Knowledge is power. The educated physician of to-day is a man of broad culture and trained in the fundamental sciences that underlie medicine; he has a good knowledge of the history of medicine and of the means by which advances have been made. He knows the past and looks into the future. He is familiar with the results of modern scientific research, and is able to maintain the dignity of a learned profession. He knows that medical and surgical science are inseparable, that preventive surgery is identical with preventive medicine as the great aim of modern medical research; that operative surgery and practical medicine have the same object, namely: the restoration of physiological function. The complete restoration of physiological function is ideal surgery.

The prevention of small-pox by vaccination;

the cure of diphtheria by antitoxin; the cure of lock-jaw and of hydrophobia by the injection of serum; the discovery of the germ of Asiatic cholera, of the bacillus of tuberculosis, of leprosy, and of epidemic infantile paralysis; the discovery of the mosquito as the cause of yellow fever and malaria, and the prevention of these diseases by the destruction of the breeding places of these insects, are examples of the value of modern medical research.

The discovery of the action on the blood vessels of the secretion of the suprarenal gland; the remarkable mental and physical improvement of backward and defective children by the administration of the extract of the thyroid gland; and the fact, as stated by Sajous, in his great work on "The Internal Secretions," that "the vermiform appendix is *not*, as now taught in textbooks, a functionless structure of low vitality, but that it secretes a relatively large quantity of succus entericus containing auto antitoxin to insure asepsis of the appendix, and of the caecal cavity particularly exposed to the accumulation of putrefactive material," are further examples of the benefits of research investigation.

Recent research has enriched our knowledge in physiologico-acoustics and in the mechanism of voice production. The doctrine of ages that the human voice was produced by a stringlike vibration of the vocal chords is disproved and abandoned.

The mechanism of production of vowel sounds, and the photographing of the human voice whereby the voice teacher is enabled to demonstrate

good voices from bad and also to illustrate the progress of the pupil in tone production, and whereby the physician is enabled to show by means of photographs the correctness of his diagnosis in voice complaints, are new lines along which research studies have extended.

The re-education of the hearing in cases of sclerotic deafness is another interesting advance.

In every science, art and industry, energies are strained in the pursuit of original research. George Crocker's legacy to Columbia University of more than six hundred thousand dollars, for the sole purpose of research investigation into the cause and prevention of cancer, indicates a deplorable absence of knowledge upon this subject.

The causation of tumors needs investigation. Every field of medical science is in urgent need of the light of scientific research.

Many questions concerning the tonsils await the light.

What is a normal tonsil?

Has the normal faucial tonsil any function?

Has it an internal secretion?

Is it a protective organ?

What is the object of the system of closed lymphatic canals that occupy the follicles of the tonsil?

What is the cause that leads to the constant appearance of the strong fibro-aponeurotic sheath that encases the faucial tonsil like an armor-plate, unperforated by blood vessel, nerve or lymphatic?

What function is served by this fibro-muscular capsule that its growth becomes a necessity?

Has the tonsil a mechanical function?

Has it a phonetic function?

Has the normal tonsil any influence on the voice, in singing or speaking?

M. Hicguet, in presenting his research report to the *Société Belge D'Otologie, De Rhinologie et De Laryngologie*, on the "*Function and Utility of the Palatine Tonsil*," stated that "the diversity of theories which he had met with in his work had put him to much pains to form the conclusions at the end of his report; and he explained why he is not enthusiastic about any of them."

I have made a research investigation concerning the functions of the faucial tonsil. My first inquiry brought this answer, "If you will define what you mean by a *normal* tonsil, I will be pleased to reply." Therefore, a definition of what constitutes a *normal tonsil* became at once a necessity. My definition is arbitrary, but was essential as a base for inquiries.

My inquiries were sent to every professor of physiology, physiological chemistry, biology, pathology, bacteriology and laryngology in the world of whom I had any knowledge. Some answered categorically; some said that they had no knowledge; some sent literature; some made no reply. I also addressed all of the most noted voice physicists, voice trainers and voice users.

The highest authorities expressed personal interest in my work, and they contributed with the greatest detail.

Professors Fränkel, Marage, Brieger, Von Levinstein, Von Gutzmann, Jacobi, Raoult and others courteously sent me copies of their original works, in place of routine answers.

And still others sent me personal communications, not for publication but containing views of such general interest as to induce me to overstep just enough to permit these convictions to become known without divulging the privacy of their authorship.

Among others, I received the following replies, from professors in *Columbia University, Harvard, Pennsylvania, Johns Hopkins, McGill* and other universities:

"I have delayed answering your letter until I might consult with some of our younger laryngologists thinking that they might help you. I find though, from what they tell me, that their facts as regards the physiology of the faucial tonsil are too meager to be of any real service, though they admit that occasionally there is removal of what are subsequently found to be histologically normal tonsils."

"There is at present a startling onslaught upon the tonsils, which often passes the bounds of reason. Whether the present attitude of the profession results in more good or harm I do not know, and I hope that you will find out."

"I feel that it means much to know when not to operate upon the tonsils. And we must if possible know their function and the evils of sacrificing that function."

"I am very glad to know that you are investigating this subject, because I believe, as the result of my own observation, that there is altogether too much operative procedure in relation to these important organs."

"Particularly in nose and throat work there has

been published a lot of fake work which is simply a matter of personal advertisement for the author, and it is beneath the contempt of the profession to further countenance it."

"Nothing offends me more than the indiscriminate tonsillar slaughter that is just now having what, I hope, will be a very short-lived vogue, and I am exceedingly glad that your voice has been added to those 'discordant' ones of which that of Lermoyez is an encouraging example."

"It seems pathetically strange to me that so many educated and experienced men can be led so easily and so far astray from the paths of common sense surgery and pathology by the hue and cry of a lot of raw and unbalanced fanatics."

"I have done many hundreds of tonsillotomies, *never* a tonsillectomy. I agree with *Chiari's* terse statements. I hope the 'ectomy' fad will soon be buried without mourners."

The authorities at the above mentioned universities, from whom I received the foregoing responses, evidently do not grant carte blanche permission to their students for the promiscuous performance of tonsillectomy.

Among the hundreds whom I addressed, only one medical professor refused to answer, and just one singing teacher took time to write (from Paris) that she had not time to reply.

As a result of my research, I will present some facts that show an important relationship of the faucial tonsils with science, surgery, speech and song.

CHAPTER II

ANATOMY OF THE TONSIL.

THE NORMAL FAUCIAL TONSIL.

In the pursuit of my research into the physiology of the faucial tonsil, it was necessary to define what I meant by a *normal* organ, in order that responses might be based upon identical conditions.

No complete or satisfactory definition of a normal faucial tonsil is to be found in any textbook.

DEFINITION. By the term, *normal faucial tonsil*, I mean the tonsil situated in the fauces, between the anterior and the posterior palatine arches, in healthy condition, and of such size as not to project beyond the lines of the palatine arches, nor press upon surrounding tissues, of a size so small as not to interfere with the perfect anatomical outlines of the walls of the pharynx. Upon this definition my inquiries were made, and responses received from *Von Schrötter*, *Von Chiari*, *Schmiegelow*, *Barth*, *Escat*, *Moure*, *Castex*, *Luc*, *Van Baggen*, *Lubet-Barbon*, *Ler moyez*, *Massei*, *St. Clair Thomson*, *Gleitsmann*, *Miller*, *Loewenberg*, *Mackenzie*, *Gleason*, *Holmes*, *Casselberry*, *Lamperti*, *Sebastiani*, *Shakespeare*, *De Reszke*, *Lehmann*, *Sabatini*, *Cappiani*, *Mott*, *Curry*, *White*, *Rogers*, *Von Klenner*, *Sweet*, *Rice*, *Hubbard*, *Schumann-Heink*, *Nordica*, *Tetrazzini*, *Bonci*, *Bispham*, and others.

My definition therefore having been accepted

and responded to, may be considered as a reasonable definition of a normal faucial tonsil.

Loewenberg says: "By normal tonsils, I mean tonsils of a healthy color, those not enlarged in length or thickness, and showing no evidences of chronic inflammatory processes."

Semon speaks of "tonsils projecting under normal conditions nearly, or quite up to, or even a little beyond the palatine arches."

The question of determining what is a normal tonsil is no longer difficult.

THE NORMAL TONSIL possesses a normal histologic structure. The microscope will determine this without question. Tonsils of normal structure vary in size, in different persons. A large tonsil in a large mouth is as natural as a small tonsil in a small mouth. A tonsil of normal histologic structure may be of abnormal size; it may be so large as to interfere with the natural functions of the pharynx, or it may be too small to properly perform its own functions.

ANATOMY OF THE TONSIL. The anatomy of the tonsil becomes more important as research progresses. Formerly, the word "tonsil," meant the faucial tonsil; the organ which *Escat* and other continental writers name the *palatine* tonsil. But in the light of modern research, the term tonsil is now used to designate various collections of lymphoid structures that exist in the post nares, pharynx, larynx, and at points throughout the alimentary canal; so that it now becomes necessary to specify the particular tonsillar organ to which you refer, as the *pharyngeal* tonsil, the *faucial*, the *lingual*, the *laryngeal*,

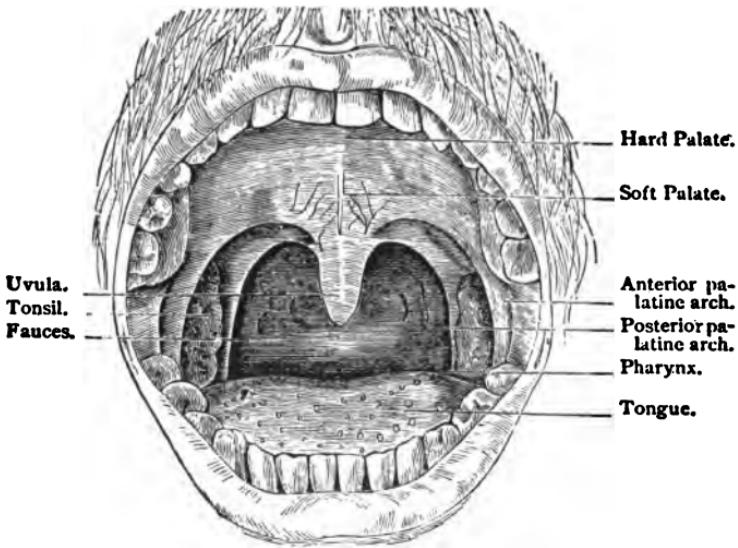


Plate showing position of the tonsils.

and so on. Without this distinction, it is impossible to discuss intelligently the subject of tonsils, because these organs, while identical in histological structure, *are not identical in their gross anatomy. Neither are they identical in their physiological function.*

A remarkable anatomical formation is *Waldeyer's lymphatic ring* (described in works on anatomy), consisting of the two *faucial tonsils*, the two *tubal*, the *lingual*, and the *pharyngeal tonsil*, *the last of which is sometimes unfortunately called "adenoids."* *Connected with Waldeyer's ring, there is another, a secondary ring, formed of similar but smaller bodies: and yet beyond this secondary ring there are countless thousands of still smaller bodies, microscopical in size, scattered about in the post nares, mouth, pharynx and larynx.*

HISTOLOGY.—*The histological constitution is the same for all the pharyngeal lymphoid tissue. The pharyngeal, tubal, lingual and faucial tonsils are absolutely identical in their histologic constitution. Koelliker, Luschka and Frey have proved these observations. (Marage.)*

The organs of the Waldeyer's ring consist mainly of what Fränkel calls nodules and tonsils. He defines a tonsil as "an organism surrounded by connective tissue which consists of adenoid tissue with genuine follicles around the fossula.

"Formerly large pockets in the tonsils were called follicles, but the *Anatomical Society* now calls the large cavity a *fossula*, and has reserved the name *follicle* for the microscopic formations.

"The nodule is a conglomeration of lym-

phatic tissue with genuine follicles. The smaller noduli are discriminated from the tonsils by having a smaller fossula and are less complicated in structure. In the pharyngeal tonsil the fossulae are not as straight and simple as in the faucial." (*Fränkel.*)

"Lymph nodes are structures so placed in the course of the lymph vessels that the lymph, in flowing toward the larger central trunks, passes through them, *undergoing a sort of filtration as it percolates through the trabeculae* of the lymph sinuses. There is considerable variation in the situation, number and size of lymph nodes, in special regions of the body." (*Delafield and Prudden.*)

These bodies, according to size, may be designated as *tonsils, nodes and nodules.*

Von Levinstein "considers the tonsil to be an organ which consists of a number of lymphatic nodules, between which there is a variable amount of tissue (which latter in case of a hyperplasia of the organ, also shows adenoid character.)"

In the faucial tonsil ten or twelve round or oval nodules are rather regularly grouped immediately below the walls of the fossulae. They consist of an extremely delicate reticulum of connective tissue. The lymph nodules surround a number of fossulae. These fossulae are lined by a mucous membrane having the ordinary functions of other mucous membranes so far as known.

"*Stöhr* states that small gaps exist between the normal epithelium of the surface of the tonsil crypts, but *Fränkel* and other distinguished investigators deny this statement." (*Levinstein.*)

"When we remove a particle of mucus from the surface of the tonsil of a person in good health, we always find that it contains leucocytes, especially microphages, filled with micro-organisms of all kinds." (*Metchnikoff.*)

"The *lingual* tonsil sometimes *overlaps* and *blends with the faucial* tonsil. The lingual tonsil atrophies at fourteen years of age, and after it has disappeared, the base of the tongue becomes carpeted over with adenoid follicles." (*Escat, Moure.*)

Von Levinstein says: "We find a great many mucous glands in the nearest surrounding neighborhood of the pharyngeal tonsil, and that these glands mainly *send their exits not through the substance of the tonsils* to their surface, but rather directly to the surface of those organs to which they belong—the soft palate and the faucial arches. To further illustrate this observation, I have shown that the group of acinous mucous glands, in the well-known figure by *Luschka* of the faucial tonsil, does not belong to the faucial tonsil proper, but to its neighborhood. Besides I have described the tonsil where it is important to observe that a great many mucous glands send their channels into the fossula of this organ—the tonsilla laryngis.

"The anatomical structure of the faucial and pharyngeal tonsils contradicts the theory that the object of these tonsils should be to produce a slimy secretion."

"The anatomical picture of the ordinary lymphatic gland differs absolutely from that of the

tonsils. Aside from the fact that the ratio of connective tissue and adenoid tissue in both organs is different, there also are missing in the lymphatic glands, especially those organs which give to the tonsil its characteristic structure, the *fossula*. Therefore, we can never identify the tonsil as simply glands, but we have to consider them as different organs."

SPECIAL ANATOMY. *The faucial tonsil has remarkable anatomical characteristics not possessed by the pharyngeal and other tonsils.*

(1) *Regarding situation.* It occupies an anatomical situation quite segregated from the other bodies that compose the *Waldeyer's ring*. Because of this segregation, and the possession by this tonsil of many features not possessed by any other body in the ring, it might well be separated from ring consideration.

(2) *Regarding surroundings.* (a) "There are no lymphatic sinuses around the tonsil." (*Retterer, Labb  and Sirugue, Hodenpyl, Most.*)

(b) "The lymph current near the tonsil is less active than that of the pharynx at some distance." (*Labb , Hodenpyl.*)

(c) "Injections made into the neighborhood of the tonsil (not even into the tonsil itself) do not spread like those made into other parts of the nasopharynx." (*Retterer, Labb  and Sirugue, Hodenpyl, Most, Jacobi.*)

"In cases of membranous throat disease (diphtheria), whenever the membrane is limited to the tonsil there is little or no glandular swelling in the neighborhood, nor constitutional symptoms.

It would therefore appear that the tonsil and its immediate neighborhood are rather inferior, in regard to facilities for absorption to the rest of the pharynx and nares." (*Jacobi.*)

Hodenpyl "found that the tonsils in a normal condition absorb neither liquid nor solid particles from the oral cavity."

(f) "*The group of acinous mucous glands in the well-known figure by Luschka of the faucial tonsil, does not belong to the faucial tonsil, but to its neighborhood.*" (*Levinstein.*)

(g) "The function of secreting mucus does not belong to the faucial tonsil, but to the glands in groups outside of it." (*Labbé and Sirugue.*)

(h) "The greater part of the lymph vessels are efferent, the smaller afferent." (*Grober.*)

(i) "It has not been proved, and it will be very difficult to prove, because it is impossible to say from the histologic picture, which are the afferentia and which the efferentia lymphatic vessels of the tonsil." (*Levinstein.*)

(8) *Regarding external surface.* (a) The external deep surface of the faucial tonsil is encased in a firmly adherent, strong, fibrous sheath. Nothing like this capsule surrounds any other lymphatic body.

(b) "*Contracting muscular fibres are inserted into the sheath derived from the superior constrictor muscle of the pharynx.*" (*Koelliker, Jacobi, Sett.*)

I am forced to believe that the strong musculo-fibro-aponeurotic sheath, that covers the faucial tonsil, deserves more serious consideration than it

has yet received from anatomists and physiologists.

So dense and tendinous and strongly adherent is this capsule that one may consider the organ as being armor-plated.

(c) *It is not perforated by lymphatics, nerves, arteries or veins.*

(d) *"The sheath sometimes sends a network of fibrous tissue as outrunners along the walls of the blood vessels which prevents them from readily contracting after being cut." (Hodenpyl, Jacobi.)*

(e) *"The sheath sends connective tissue into and between the folds of the mucosa." (Jacobi.)*

(f) *"Thick or thin, the fibrous sheath is firm and solid. That is why abscesses of the tonsil do not open into the maxillopharyngeal space." (Jacobi.)*

(g) *This dense covering of musculo-fibro-aponeurotic structure cannot be looked upon as an atavism; nor is it conceivable to view this constant and definite structure that envelops the tonsil, receives muscular fibres from the superior constrictor muscle, extends its fibrous outrunners along the walls of the blood vessels that run through the body of the organ and sends its connective tissue into and between the folds of the mucosa as a simple anatomical accident. These features are too constant to allow such interpretation.*

Is it not reasonable to think that the development of the strong, musculo-fibro-aponeurotic sheath is a result of evolution to meet some physiological demand?

The sheath of the tonsil is always present. *There must be some strong physiological reasons for the existence of this powerful anatomical contrivance.*

What are they? Have the muscular fibres that enter the sheath no use? Why does the sheath send fibrous outrunners along the walls of the blood vessels and into the folds of the mucosa? Is swelling of the tonsil ever similar to that of erectile tissue? Or ever due to muscular action?

Von Chiari, Moure, Frank E. Miller, Escat and others advise against the removal of the sheath in voice users.

(h) Smaller nodules differ from the tonsil by having a smaller fossula, and less complicated structure.

(i) "*The fossulae of the faucial tonsil are more straight and simple than those of the pharyngeal tonsil.*" (*Fränkel, Levinstein.*)

(j) The organ is of cartilaginous consistence and somewhat compressible.

(k) *The anatomical position of the organ is notable amidst a framework of muscles. It is both compressible and movable.* It changes position both in swallowing and in phonation. In swallowing the palato-pharyngeus muscle draws the palate down upon, and the tonsil in upon the food, to force it downward. The tonsil is also pressed inward in the act of swallowing by the superior constrictor and drawn inward by the palato-glossus. *There is a ceaseless and probably indeterminate, though important play, upon the faucial tonsils, by many muscles, in speaking and*

in singing. The faucial tonsil has probably more mechanical than physiological functions.

I consider it highly important to note that while the faucial tonsil changes with age in character, size, shape and consistence, it never disappears, but always remains to give to the walls of the pharynx a needed solidity. The faucial tonsils resemble the cartilages of the larynx and trachea. But they are softer. The anatomical and functional advantages of the firmness they impart to the pharyngeal wall, may be readily conceived. They serve a purpose that hard, unyielding osseous formations would not serve. They are mobile, and compressible: and by multiple movements and innumerable re-adjustments in position, have undoubted influence and effects upon the acoustics of the oral cavity, and upon the resonance and timbre of the voice.

(4) *Regarding Internal Structure.* (a) The vascularity of the faucial tonsil is slight.

(b) "The periphery of the lobules is more vascular than the centers." (*Retterer, Labbé.*)

(c) "It has little or no connection with neighboring lymphatics, through its surface." *Grober* demonstrated the comparative absence of a direct communication of the tonsil with the rest of the body through the surrounding fibrous capsule. His injections of the tonsils accumulated in large quantities under the capsule. Thus it happened that the organ was often enlarged to a considerable extent. The adipose tissue surrounding the tonsil seems to be rather devoid of lymph vessels.

(d) *Von Lenart* has proved the existence of a direct communication between the lymphatic ves-

sels of the nose and of the tonsil; and also of a direct communication between the two faucial tonsils.

(e) *Retterer, Krause, Labb  and Sirugue, and Hodenpyl*, have proved the existence of a capillary network of lymphatic vessels occupying the entire follicular mass of the faucial tonsil, constituting a system of closed lymphatic canals which do not open into the connective tissue reticulum by stomata nor by gaping extremities.

(f) *Labb  and Sirugue* have shown the origin of these lymphatic vessels in the reticulated covering, where they are represented by spaces, not partitioned, and covered by an endothelium. These lymphatic spaces are continued by the capillaries and the lymphatic vessels, furnished with a complete wall, which meet each other in the conjunctive envelope of the tonsil.

(g) “*Retterer* proved the existence of clear centers in the follicles of the tonsils, but did not admit their identity with the germinating centers of the follicles found in the ganglions.” (*Labb  and Sirugue.*)

(h) “The follicles in their centers have a lighter zone. These are producing centers, because the production of lymphocytes has been observed.” (*Fr nkel.*)

(i) “The germinative centers have certainly the same functions as those of the ganglions which are, as *Flemming* has shown, the localities for the production of leucocytes. There is in the germinative centers an incessant cellular renovation.” (*Labb  and Sirugue.*)

(j) “*Ehrlich* and *Flemming* have in fact

shown the existence of several kinds of leucocytes, upon each of which devolves a different rôle, a particular function in the defense of the organism against microbes and toxins." (*Labbé and Sirugue.*)

(k) We find in normal faucial tonsils always follicles with cell producing centers.

(l) *Retterer* proved that the periphery of the lobules is more vascular than the centers.

(m) The vascularity of the organ is slight.

(n) The nerve terminations in the tonsil are not well known.

The faucial tonsil varies in not only size, shape, consistency and color, but in weight and general appearance. It varies in different individuals, and the two tonsils often vary in the same person. The anatomical characteristics constantly change from infancy to old age. It does not remain for many years the same; but it never entirely disappears.

They are largest from three to eighteen years of age. Not so large under three years. After eighteen years of age, they diminish in size, their surface becomes smooth, and their consistence firmer and more cartilaginous. They frequently enlarge and annoy during childhood; they generally cease to annoy beyond puberty.

"Exposure and many diseases, change the surface and the structure of the tonsils. Cell infiltration and cicatricial tissue render absorption less possible. Blood and lymph vessels are compressed and undergo atrophy. That's why in advanced life the tonsil gets harder and smaller, and infections become less." (*Jacobi.*)

The more highly complex tonsillar tissue occurs only in the highest type of animal development. If tonsils have no physiological function and are only an atavism, they likely would have disappeared, instead of continuing to reappear, in a simple form in the lowest vertebrate, to the highest and most complex form in man.

Surgical Anatomy. Haymann says: "Operations on the tonsils are looked on as being without danger. However, bad results do occur. Severe bleeding may follow operations on the tonsils. When they bleed too much, they call them hemophiliacs."

Merkel says, that "the veins between the muscles of the pharynx and the outer fascia form a strong irregular network, called the *plexus pharyngeus*. Injuries and bleeding from this network are not rare in excision of the tonsils."

Von Chiari mentions, that "in some cases you can see at the side walls of the pharynx a large vessel pulsating, the *arteria pharyngea ascendens*. In such cases it is possible to injure this large vessel."

Dupuy states, that he "has several times observed a vessel the size of a crow-quill, superficially situated, and pulsating, coursing along the juncture of the posterior and lateral walls of the pharynx." I have seen this vessel.

Angioma of the base of the tongue is common. Networks of varicose veins are frequently seen at the base of the tongue and in the walls of the fauces and pharynx.

Delavan states, that "Both carotid arteries are behind the faucial tonsil, the internal carotid one

and five-tenths centimeters, the external carotid two centimeters, distant from its lateral periphery."

It is not uncommon for arteries and veins to follow anomalous courses and to be found out of their natural positions. The vessels in the neighborhood of the tonsil form no exception to this statement. In fact, the internal and external carotids with their branches are particularly crooked and irregular in their courses.

Gray says, that "The internal carotid artery is remarkable for the number of curvatures that it presents in different parts of its course."

The external carotid sometimes curves from its regular course inwardly toward the median line behind the tonsil. Branch arteries in the region of the tonsil are frequently enlarged.

"Abnormal distribution of blood vessels is a more frequent cause of hemorrhage than hemophilia," according to *Barrell and Orr*.

"In all operations upon the tonsil we should remember the close proximity of the internal carotid artery. Instances have occurred in which this artery has been wounded during the operation of scarifying the tonsil, and fatal hemorrhage has supervened." (*Gray's Anatomy*.)

This statement is repeated in each and all editions of Gray's Anatomy.

In the 17th edition, *Gray* says, "The profuse bleeding which sometimes follows an operation for the removal of the tonsil is *very seldom* due to injury of the internal carotid but to injury of the ascending pharyngeal or one of the palatine branches."

"The arteries that supply the tonsil, from which dangerous bleeding also occurs, are the dorsalis linguae, the ascending palatine, and the descending palatine, from the external carotid."

Schmiegelow has reported the case of an immediate death from injury of the carotid, by curtte, due to an anomaly in its course.

William H. Pancoast, at his *Clinic*, at the *Medico-Chirurgical College, Philadelphia*, in cutting out a tonsil cut the internal carotid artery. (Reported by *George F. Steveson*.)

Treves, in his *Surgical Anatomy*, reports a fatal accident from perforation of the ascending pharyngeal artery.

Haymann reports injury of the ascending pharyngeal.

Haymann says: "If the cavity of the mouth is highly arched and narrow, injury of the post nares cannot always be avoided in excising the tonsils."

"The vomer has been injured. And injury of the back part of the nasal septum may cause severe bleeding."

"*Zarniko* accidentally cut off the greater part of the back horns of the turbinated bones."

Von Chiari states that "The atlas bone may be injured in enucleation of the tonsil."

CHAPTER III

PHYSIOLOGY OF THE TONSIL.

To assign a physiological role to an organ, when its anatomy has not been clearly defined, is an injudicious and dangerous assumption. The anatomy of the triangles of the neck, or of the femoral region are not more complicated than the anatomy of the area composing the pharynx; and the physiology of the pharyngeal region is vastly more complicated than that of any other.

The anatomy of the pharynx is not thoroughly understood; and its physiology remains unsolved. On account of the great difficulties naturally encountered in this field, as for example, the apparent impossibility of determining the action of certain muscular fibres that always become lost in their final distribution, the details in the anatomy and physiology of the pharynx may never become known. Furthermore, clinical opportunities will rarely be numerous enough to decide the exclusive or partial port of entry of a specific germ or poison into the circulation from the pharynx, as we are seldom in a position to separate the various anatomical structures from their neighbors during the acute invasion or the rapid progress of a microbic or toxic poison.

The faucial tonsil is a natural organ. Some questions pertaining to its physiology are settled. Judgment upon others is so uniform as almost to force conviction; and some are unsolved.

In the determination of its functions, it is par-

ticularly necessary to carefully separate, and to critically examine, the different anatomical structures composing the *Waldeyer* lymphatic ring. It is also well to observe the anatomical position of the faucial tonsil, and its relationship to neighboring organs.

When we speak of the faucial tonsil, we must refer alone to this organ. When we speak of the pharyngeal tonsil, or the laryngeal, we must not think of the faucial, for these three tonsils have different functions. And when we speak of the *Waldeyer* ring, then our speech must represent a composite thought of composite bodies possessing varied functions.

SPEAK ACCURATELY. ASSUME NOTHING. The faucial, pharyngeal and laryngeal tonsils differ in their functions as well as in their structure. *Waldeyer's lymphatic ring* is an important and complex physiological apparatus.

The ensemble of adenoid bodies composing the *Waldeyer* ring situated at the entrance of the respiratory and digestive passages, constitutes the first line of defense against microbic invasion. It is composed of the pharyngeal, faucial, lingual and tubal tonsils. The first line of defense is sustained by a second, represented by the tributary ganglions of all the pharyngeal lymphatic network so well presented by *Escat*, in his work on *Les Maladies du Pharynx*.

FUNCTION OF LYMPHATIC GLANDS. The function of the lymphatic glands is to act as a sort of filter for the lymph. Should the lymph contain any foreign substance

or toxic material, these tend to be stopped within the gland, not only on account of the anatomical peculiarities of the structure, but also on account of the cellular hyperplasia that results from the irritation. This barrier action, as will be readily understood, is a most important one. The lymphatic glands are set like sentinels to guard all the orifices and channels of the body. This function of the glands has been clearly demonstrated by Bizzozero, Ruffer and Ribbert.

Lymph nodes are structures so placed in the course of the lymph vessels that the lymph, in flowing toward the larger central trunks, passes through them, undergoing a sort of filtration. If this fact be borne in mind the lesions of the lymph nodes, which are in the majority of cases secondary, are much more readily understood.

"Particles of pigment, cells from malignant tumors, dead or disintegrating cells, red blood-cells, bacteria, etc., which in any way get into the lymph vessels, are carried along until a lymph node is reached, and here they are, in part at least, deposited among the trabeculae of the sinuses, or are taken up by phagocytic cells, while the lymph passes on and out of the efferent vessels." (*Delafield and Prudden. Text-book of Pathology, Eighth Edition, 1907.*)

Some years ago *Stöhr* demonstrated that the wall of the intestine, and especially the tonsils and other lymphoid organs, are traversed by an enormous number of leucocytes, which exercise a kind of migration towards the cavities containing micro-organisms. This continual and normal condition is often termed *Stöhr's phenomenon*.

"When we remove a particle of mucus from the surface of the tonsils of a person in good health we always find that it contains leucocytes, especially microphages, filled with micro-organisms of all kinds." (*Metchnikoff, Immunity in Infective Diseases*, 1905.)

"The leucocytosis of infectious diseases may be regarded as the effort of the blood-producing organs to protect the blood and tissues by means of leucocytes against the invasion of micro-organisms and against the action of toxins in the circulation." (*Delafield and Prudden.*)

Of the protective action of the *Waldeyer ring*, with its secondary tributary line of defense, it has been said, that the pathogenic agent must then traverse, theoretically, two stages before invading the general circulation, the one *pharyngeal*, the other *ganglionic*. This apparatus of physiological defense may at any time be inferior to its task, and powerless to arrest the microbic invasion and the toxæmia either by reason of its constitutional insufficiency or by reason of the excessive virulence of the enemy with which it enters into a struggle.

The pharyngeal tonsil is a most important organ in the first line of defense of the system against microbic invasion.

Hypertrophy of the pharyngeal tonsil constitutes the affection commonly known under the name of "*adenoid growth*." The process of phagocytosis long sustained will bring on chronic hypertrophy.

Enlargement of the pharyngeal tonsil ("*adenoids*") being due to an increase in the process of

phagocytosis, removal of this organ while in the condition which represents the height of its bactericidal energy is a vital mistake. The line of defense against microbic invasion is thereby broken.

Westenhöffer, in a most exhaustive research on the "Pathological Anatomy and the Way of Infection in Spinal Meningitis," has given absolute proof that the "infectious germs enter the organism through the pharyngeal tonsil and in no other way."

"In all cases," he says, "the pharynx was in a condition of acute swelling and inflammation. This swelling extended in all cases down to the pharyngeal wall. In all cases the orifices of the Eustachian tubes were equally swollen. In all cases the anterior part of the nose was free from inflammation. *The increased mucus secretion was always in the superior nasal region, never in the anterior part of the nose.* The faucial tonsil and arches appeared to be reddened or swollen in less degree; sometimes hardly at all. *The pharyngeal tonsil is swollen.* In all cases this tonsil was in a state of acute swelling and redness. I believe that the disease germ finds its entrance into the tissue of the body from the posterior naso-pharynx, especially from the pharyngeal tonsil. *I have in cases of just beginning meningitis seen where the disease begins and it always begins at the hypophysis just above the sella turcica.* We can judge from this that the meningitis infection gets there through the sphenoidal body or via the blood vessels which pass from the naso-pharynx to the sella turcica. It is impor-

tant that in ten cases an inflammation of the sphenoidal cavities has been seen." (*Westenhöffer, Berliner Klinische Wochenschrift*, June 12, 1905.)

Westenhöffer has proved that the pharyngeal tonsil and the adjacent lymphatics act as a portal of entry for the germs of cerebro-spinal meningitis. He considers the faucial tonsil as little or not at all involved as a port of entry for the particular germs of cerebro-spinal meningitis.

He "considers the pharyngeal tonsil to be a protective organ, active as a barrier to the entrance of germs, through the process of phagocytosis, except when by reason of extreme virulence and great numbers of the infective germs this protective influence is overcome."

The pharyngeal tonsil as we have now seen is a protective organ; and in some circumstances an avenue of entrance for infective germs, a filtration organ for material that enters by way of the nasal passages.

Von Levinstein "has described the tonsil where it is necessary to observe that a great many mucous glands send their channels into the fossula—the *tonsilla laryngis*. The function of this tonsil consists in the production of a slimy secretion to keep the vocal cords limber."

"*Stöhr* discovered that an interrupted immigration of leucocytes takes place from the follicle and adenoid tissue through the epithelium into the fossulae and buccal cavity. The phenomena described by *Stöhr* present themselves under various aspects: sometimes as a passing of poly-nuclear leucocytes through the epithelium, some-

times as a multiplication of epithelial cells caused by irritation of the mucosa. And finally perhaps sometimes of the penetration of some lymphocytes coming from the reticulated skin. But in all these hypotheses, the signification of the phenomena is identical; it is always a phenomenon of cellular reaction, having for its aim the defense of the mucosa against the invasion of microbes which vegetate at the surface of the tonsil. This phenomenon is in no way special to the tonsillar mucosa; it is produced at the level of all the mucosae and has already been well studied and described by *Cormil* and *Ranvier*, in the buccal mucosa." (*Labbé* and *Sirugue*.)

"There is in the germinative centers of the tonsil an incessant cellular renovation. *Stöhr* admits the passage of leucocytes through the epithelium into the buccal cavity." (*Labbé* and *Sirugue*.)

"The phenomena of absorption at the level of the tonsils has been studied experimentally. In *Hodenpyl's* experiments, the epithelium of the tonsils prevented absorption, which only becomes possible if it is destroyed, or if the substances are introduced under the epithelial bed, and even under these conditions, the absorption is very slow. *Hodenpyl* experimented with fatty substances, powders and colored solutions." (*Labbé* and *Sirugue*.)

"The epithelium has the same protective role at the level of the tonsils as at the level of the buccal mucosa. The crypts augment its extent."

"Even in the normal state the epithelium is

always more or less irritated, and above all, at the bottom of the crypts and we have seen that it is the seat of the incessant phenomena of cellular renovation. This epithelial irritation is due to the presence of dust, or small foreign bodies which penetrate into the crypts; it is due above all, to the existence at the surface of the tonsil of pathogenic microbes, which are found constantly in the normal state. These microbes, although in the crypts, are on the exterior of the tonsil, and it is the defense reaction of the epithelium which prevents their penetration."

"It is only where the epithelium is destroyed that the microbes penetrate and in such cases they rarely pass beyond the conjunctive bed; it is only in the case of the complete destruction of the epithelium that they may be found in the follicle. The leucocytes have not solely a phagocytic role, in regard to microbes, but they destroy also their toxins in producing antitoxins and divers substances; nucleins and oxydases, which have positive chemico-toxic properties in regard to white corpuscles and exalt their vitality." (*Labbé and Sirugue.*)

"Tubercle bacilli reach the lungs by the bronchi or via the blood vessels. *Valland* claims that the infection of the lungs can occur via the tonsils and infected glands of the neck. Many authors claim that healthy tonsils do not allow the entrance of bacteria." (*Grober, Die Tonsillen als Emtrillspforten für Krankheitssneger, besondes für der Tuberkelbazillus.*)

Acute catarrh of the tonsils shows increased infiltration with leucocytes, which causes enlarge-

ment of the organs, also increased amount of lymph in the intercellular spaces.

The increased exudate is an agreeable medium for many parasites, therefore inflamed tonsils are suited for the settling of the microbes. The microbes having entered the tonsils are mostly destroyed because the serum kills them. The power of the leucocytes as phagocytes kills them also. *Packard* claims that the microbes of the acute inflammatory rheumatism are streptococci weakened through the action of the tonsils, otherwise we would see septic diseases oftener.

"It is also possible that the microbes enter the system through the blood vessels." (*Grober.*)

"The tonsils seem to be a less favorite settling place for tubercle bacilli than the lymph glands for we find scrofulous glands oftener than infection of the tonsils. The latter seem to serve as an entrance portal for the tubercle bacilli." (*Grober.*)

"The more radical prophylaxis would be to remove all tonsils which is not possible without a serious operation, and even then many equivalent parts of the lymphatic throat ring would be left to take the role of the tonsils." (*Grober.*)

Another question would be whether the chronically diseased tonsils should not be removed.

"Many authors have considered diseased tonsils as more liable to microbial infection, than healthy ones. *If that is true, it is not proven.*" (*Grober.*)

"Besides the medical science shows that the entrance of microbes into the system does not always produce the disease. It is important how strong the defensive processes of the body are.

Therefore, infectious diseases are mostly constitutional diseases." (*Grober.*)

Has the faucial tonsil a protective mechanism to protect itself against infection? Or, does this organ serve as an entrance for most infections which attack the general system?

Two theories, which concern the physiological function of the tonsils, consider chiefly the behavior of these organs towards infections. One theory says that the tonsils through a protective mechanism, are protected against infection—the theory of *Brieger* and *Goerke*.

The other theory says that the tonsils offer no resistance at all to any infection, and that they serve as an entrance for most infections which attack the organism.

Brieger shows that the elements of the adenoid tissue are not leucocytes, but lymphocytes, and that to these latter the faculty of active movement has to be denied, as it is impossible, *Brieger* says, that "the lymphocytes enter the epithelium on their own accord. On the other hand, it can be proven through the microscope that lymphocytes in lesser or greater degree are always present in the epithelium of the tonsils. We have to assume a vehicle which carries the lymphocytes from the adenoid tissue; this vehicle," according to *Brieger*, "is the lymphatic juice which fills all crevices between the tissue and which gets to the surface through the finest canals. The cause of the movement of the lymphatic current is to be found," according to *Brieger* and *Goerke*, "in a difference of pressure in the afferent lymphatic vessels and the free surface. Increase of blood

pressure increases the force of the lymphatic current. Therefore, if the blood pressure is increased, the lymphatic juice flows stronger, and quicker through the epithelium, and carries along a larger amount of lymphocytes out of the adenoid tissue."

"The stronger the lymphatic current flows through the epithelium, the larger the amount of the lymphocytes, the more the epithelium will have to suffer." But *Brieger* and *Goerke* do not speak of a destruction of the epithelium in such a case. "But," according to these authors, "the continuity of the epithelium in a particularly strong lymphatic current is only temporarily torn by the strong lymphatic juice, and the continuity is re-established immediately as soon as the intensity of the lymphatic current is diminished."

"Beside the theory of *Brieger* and *Goerke*, that the mechanism of the tonsil furnishes a protective function, there is another protective theory, that of *Gulland*, *Kümmel* and *Lindt*. *Gulland* believes that the tonsils are enabled to hinder germs from entering deeper into their substance and thus to work against an infection of the organism. *Gulland*, *Kümmel* and *Lindt* say that the tonsils can do this through the leucocytes which possess amaeboid motion as well as the faculty of phagocytosis."

"*Gulland* states that as soon as an infectious germ gets into the depth of the organ, leucocytes devour it and bring it back to the surface."

"*Brieger* opposes this opinion, showing that in the tonsils we have no leucocytes, but mainly

lymphocytes, which have no amaeboid motion. *Brieger* ascribed the power of the tonsils to protect themselves against infection to the fact that the tonsils have a continuous lymphatic current running from the inside to the outside of the organ. This current works against the entrance of germs, as the current assisted by the lymphocytes washes the infectious germs away. *Goerke* mentions the observation of *Fränkel* that children with hyperplastic tonsils are less easily affected by diphtheria than children with normal tonsils. *Goerke* thinks that the bacteria enter the tonsils, not through the parenchyma of the tonsils, but through the other mucous membranes of the pharynx."

"In this view, the researches of *Menzer* are of great interest, which prove that just in that disease wherein the entrance of the cause through the tonsil was considered assured, acute articular rheumatism, the infection took its way through the adjoining tissue, while the tonsils only became diseased secondarily from the inside. *Goerke* claims as a proof for his theory the explanation of *Fränkel*, given for angina traumatica, that infectious germs in the nose (after nasal operations) can be transported via the lymphatic vessels to the tonsils and there produce local symptoms." "We see," *Goerke* says, "in the *Waldeyer ring*, a mechanism in action which in a nearly perfect way makes the tonsils the most important protective organ in the body, and in this sense we dare speak of the function of the tonsils."

"Finally, *Goerke* calls attention to the fact that

it has been attempted to assist the active physiologic moment in the tonsils, by means intended to accelerate the lymphatic current, that is, by the suction treatment of the tonsils in different inflammatory processes of these organs." (*Levinstein.*)

"*Schoenemann* says, the tonsils very rarely become diseased primarily, but almost always secondarily. According to *Schoenemann*, acute tonsillitis has to be considered as an inflammation following an inflammation of the neighboring tissue. The angina fossularis, according to *Schoenemann*, in most cases is caused by infectious germs which get into the tonsils via the lymphatic vessels from the primarily diseased mucous membrane of the nose and produce a secondary disease of the tonsils. *Schoenemann* mainly blames acute coryza as being the origin of angina, assuming that many infectious germs present on the affected mucous membrane of the nose reach the tonsils by the lymphatic vessels and produce acute inflammation of the tonsils. A proof that this opinion is right *Schoenemann* finds in the fact that he has often observed that angina (tonsillitis) often relapsing *did not occur again after the nasal mucous membrane had been carefully treated.*" (*Levinstein.*)

"The immigration of leucocytes from the inside of the tonsil through the epithelium, as discovered by *Stöhr*, at certain places is so strong that it is difficult to find the epithelium. By this discovery of *Stöhr* the idea was formed that the tonsils represented an open wound of our body,

so that it was easy for micro-organisms to enter here into the tissue."

"On the ground of *Brieger's* observations, it is generally assumed that leucocytes only occur occasionally, and that we have here mainly lymphocytes."

"The lymphocytes, as you know, have a nucleus with little protoplasm, while the leucocytes have much plasm and a certain ameboid movement."

"The lymphocytes do not possess this motion, and if lymphocytes pass through the epithelium, we have to assume that they are forced through by the lymphatic current which flows from the tissue through the epithelium. If we assume that the lymphatic current simply takes along the lymphocytes like logs in the river, we have to omit the idea that we have here to consider an open wound but that we have to learn to consider it a protective mechanism, for the micro-organisms have to swim against the current and meet cells which possess a certain phagocytosis. Therefore, the idea of Brieger that the tonsil is a protective mechanism has to be generally accepted, and we cannot talk any more of the tonsil being an open wound." (Fränkel.)

"A surface lesion must always be supposed to exist when a living germ or toxin is to find access. It looks rational to admit that where there is merely a surface lesion, though ever so slight, there may be an invasion into the tonsil. When, however, the vessels are exposed to pressure by newly formed cells or tissue, there is no invasion,

certainly not beyond the tonsil itself, no ganglionic swelling, no toxic poisoning."

"It is even rational to believe that now and then, when tonsils, or what is more common, a single follicle, becomes inflamed, the very venous obstruction will exert the bactericidal influence of the stagnating blood serum."

"Cell infiltration and cicatricial tissue render absorption less possible. Thus, even when the surface is broken, the tonsil must not be considered as a sure port of entry for infectious germs. Whenever the membrane of diphtheria is limited to the tonsil, there is very little, or no, glandular swelling in the neighborhood. Dozens of years ago, I could prove that diphtheria, when limited to the tonsils, was least dangerous. These clinical observations have stood the test of time and must be reckoned with."

(Jacobi.)

Thus the tonsils are proved to have little or no absorptive power when attacked by diphtheria.

Schmiegelow looks upon the tonsil as a part of the protecting system, which is represented by all the lymphoid tissue to be found everywhere in the mucous membrane of the pharynx and naso-pharynx.

Escat believes that the faucial tonsil has the function of phagocytosis as studied by *Metchnikoff*.

Massei believes the faucial tonsils have a biologic function similar to the lymphatic tissue which forms the so-called *Waldeyer ring*.

"The question, what object have the lymphocytes which are forced through the epithelium?

leads to the opinion that it must be a certain safety valve action which prevents the continuous formation of lymphocytes placing the lymphatic vessels under too high a pressure. The epithelium itself does not need for this process to have large channels. *If, in the immigration of white corpuscles through the walls of the blood vessels no holes are made in those vessels, neither is it necessary that a hole be formed in the epithelium of the tonsil when lymphocytes pass through.*" (Fränkel.)

"The infection from the outside of the tonsil is the same as on other parts of the body. The *infection of the tonsil from the blood has not been sufficiently considered*, at least I do not find it often enough in the ideas of physicians. If one injects into the veins of rabbits colored particles we can show them in the tonsils. After certain operations in the nose, in many cases two days later, angina (tonsillitis) occurs."

"If we try to understand these observations we must assume that *microbes from the nose have entered the tonsils, that the operation in the nose has opened the door through which the micro-organisms could get into the lymphatic circulation to affect the tonsils.* If you inject Chinese Tusche (black color) under the lining of the nose of rabbits, dogs and hogs, you can show in a short while these color particles in the tonsils. We can think now that angina is caused from distant organs, especially from the nose, and perhaps the preparatory coryza which we often find in angina is because of the angina itself. This idea affords for infectious diseases

another consideration. *We can now not think any more that this is caused by microbes advancing through the mouth.*"

"We observe angina in many secondary diseases. One of the best known is the periton-sillar abscess. The micro-organisms invade the tissue surrounding the tonsils."

"It is important to understand that the tonsils can be infected from the blood and the lymphatic vessels with tuberculosis, just as from the surface, but I believe that most infections which we find in the tonsils are secondary, mostly from the nose. These cases belong mostly to the latent tuberculosis. Children are comparatively healthy." (Fränkel.)

"The protective theory of *Brieger* and *Goerke* would seem to have a great deal of probability if it were proven absolutely that the lymphocytes have not the power of locomotion. So far this does not seem to have been proven. The current has not been seen by anybody or proved by anybody. In the current theory at this time we can see nothing but an erudite hypothesis." (Levinstein.)

"There is no doubt that a great number of the ordinary anginas have to be considered as a primary acute infection of the tonsils. Of course, the tonsils become diseased secondarily, like the one we see in secondary lues and condylomata. I have also to mention the well-known angina, following endonasal operations."

"In these diseases, called by *Fränkel* angina traumatica, the infection occurs in this way,

namely, that the germs are transported from the nose to the tonsils and produce local symptoms." (*Levinstein.*)

"Brieger assumes a current which permanently flows through the whole organ from the inside to the outside and which carries along more or less lymphocytes. If this current is very strong the number of lymphocytes is larger and the alteration of the epithelium more pronounced."

"The insult to the epithelium by the current loaded with lymphocytes does not produce the effect that microbes get more easily into the tissues, as the intervals in the epithelium are constantly filled with the current and the possible lesions to the epithelium are *never lasting* defects but *disappear as soon as the intensity of the current is diminished. But nobody has seen this current and that the lesion of the epithelium is only transitory has not been proven.*"

"We are not entitled to see in the histologic picture of the tonsil a proof for the existence of the current flowing from the inside to the outside of the organ."

"There is not a single experiment which proves that the tonsils possess the faculty to resist the entrance of microbes with greater success than the mucous membrane of the pharynx is able to do. Therefore, we must say that *experiments so far do not prove a distinctive protective mechanism of the tonsils, although they do not oppose such a possibility.*" (*Levinstein.*)

"*There seems to be no doubt that the tonsils are very often diseased primarily, and that their frequent secondary infection does seem to be ap-*

proved, and that they are particularly well protected against infections.” (Levinstein.)

“The infection theory of the tonsil considers that most diseases of the human being are produced by a primary infection of the tonsils. Winslow claims that the tonsils are a menace to the organism. I rather believe that the infection theory is too extreme, and I believe that the tonsils offer less resistance to infectious germs than the other lymphatic organs of the throat. But if the tonsil offers less resistance to infections than its neighborhood we are not yet entitled to talk of a danger to the organism. And if Bosworth, Hendelssohn, and others, come to the conclusion that the tonsils are a constant danger and should in all human beings be totally eradicated, I cannot come to the same conclusion, for if I know of an organ that becomes easily infected, this organ should not be destroyed, but we should try to perfect it as much as possible against the danger of infection, which in the tonsils is not so difficult to do.”

“We want to make the organ more resistible. We want to cure and not destroy. Total and lasting destruction is, as Goerke has proved, absolutely impossible. The tonsils as organs easily infected have to be particularly protected against the possibility of infection.” (Levinstein.)

*Harrison Allen believed that a large per cent of children suffering from hyperplasy of the fau-
cial tonsil, who mentally and bodily remain be-
hind normal children, has to be considered as sub-
ject to an inner secretion of the hyperplastic or-*

gan which produced a damaging effect on the organism.

Escat "believes that the faucial tonsils have not for their only function that of phagocytosis studied by *Metchnikoff*, but also a physiological and biological function, due to an internal secretion. He believes, in accord with *Allen*, that the tonsils secrete a principle the nature of which it has been unable to determine, but which should be useful in the development and to the growth of the subject, and *probably to the growth of the skeleton.*"

Masini "believes that the tonsil has an inner secretion similar to the suprarenal and other glands.

"He injected many animals with the extract of tonsils, and produced an increase in the arterial pressure. *Scheier* made analogous experiments by which he produced a decrease in arterial pressure. *Pugnat* repeated these experiments, but could not produce either increase or decrease in the arterial pressure. *Masini*, *Scheier* and *Pugnat* had all three different results, and so proved nothing."

The *haematopoietic* theory of *Harrison Allen*, *Kayser*, *Pluder* and *Schoenemann* considers the function of the tonsil to be that of producing new colorless blood corpuscles. As we find in normal tonsils always, follicles with cell producing centers, we can claim with assurity that in the normal tonsil new lymphocytes are produced, and *that in the hypertrophied tonsil the number of newly formed lymphocytes is always considerably larger*

than in the normal tonsil. In the atrophic tonsil new lymphocytes are not formed.

"The question as to what becomes of these newly-formed lymphocytes is not decided. That they are put into the circulation has to be considered doubtful, so long as it has not been proved that the vasa efferentia of the tonsil contain a larger amount of lymphocytes than the afferentia. So far this has not been proved, and it will be very difficult to prove because it is impossible to say, from the histologic picture, which is the afferentia and which the efferentia." (Levinstein.)

"Not a small number of the lymphocytes constantly leave the tonsil, by wandering through the epithelium. I have proved that a considerably larger number leave the hyperplastic tonsil than the normal organ. *What we know is simply the fact that new lymphocytes are formed in the normal tonsils.* What becomes of them we do not know." (Levinstein.)

"I cannot approve of eradicating the tonsils. If one tells me that the tonsils have no distinct function, and on the other hand, become easily diseased, and therefore not the slightest cause exists to save these organs, I must say that it is not impossible that the tonsils have a distinct physiological function, only thus far we have no proof of it. And then even if we were sure that the tonsils had no distinct function, I would not give up my conservative standpoint, for if an organ of our body and even one which is not necessary for the existence of the organism should prove less resistible than other organs, this cir-

cumstance does not at all entitle us to destroy this organ." (*Levinstein.*)

In concluding his scholarly review and masterly criticism of the many hypotheses regarding the faucial tonsil, *Von Levinstein* says: "No theory considering the physiology of the tonsils can be approved of. A proof that the tonsils fill a peculiar function important for the organism has not been given by anybody. Whether they have such a function cannot yet be decided. It has not been settled whether the tonsils have a value or not for the organism."

The existence of the lymphatic current from the inside of the follicle through the epithelium to its surface has not been seen by anybody. *Brieger and Fränkel assume that it exists.*

Stöhr's idea that the epithelium of the tonsil represents an open wound has been well combatted by *Fränkel* and by *Jacobi*.

The elaborate and conscientious research works of *Retterer*, *Labbé* and *Sirugue* and *Stöhr*, and the original investigations of *Brieger*, *Goerke*, *Gulland*, *Lindt*, *Kümmel*, *Metchnikoff*, *Bosworth*, *Hendelssohn*, *Lexer*, *Menzer*, *Allen*, *Kaysér*, *Pluder*, *Scheier*, *Masini*, *Hodenpyl*, *Pugnat*, *Wood*, *Fox*, *Scanes Spicer*, *Schoenemann*, *Merkel Fränkel*, *Levinstein*, *Magouby*, *Hicquet*, *Broeckaert*, *Von Lénárt*, *Grober*, *Poli*, *Frederici*, *Most*, *Goodale* and *Hartz* have not proved that the faucial tonsil has any physiological function.

(1) *There is no proof of a lymphatic current running from the inside of the tonsil to the surface of its epithelium*, as suggested by *Brieger*.

(2) *There is no absolute proof that the lymphocytes have not amoeboid movement, as suggested by Brieger.*

(3) *There is no proof that the tonsil possesses the power of phagocytosis as claimed by Gulland.*

(4) *There is no proof that the tonsils have a haematopoietic function, as claimed by Allen.*

(5) *There is no proof that the tonsils have an internal secretion, as claimed by Masini.*

(6) *There is no proof that the epithelium of the tonsil ever presents an open wound, as stated by Stöhr.*

(7) *There is no proof that the tonsil is a port of entry for infectious germs—no proof that it has any absorbent power.*

(8) *There is no proof as to the existence of afferent and efferent lymphatic ducts leading to or from the surface, into the body of the tonsil.*

ON THE CONTRARY,

(1) *There is the proof of Hodenpyl that he could not force absorption by the tonsil of fats, liquids or powders.*

(2) *There is the proof of Grober, who demonstrated the comparative absence of a direct communication of the tonsil with the rest of the body through the surrounding fibrous capsule. His injections of the tonsil, under pressure, accumulated in large quantities under the capsule.*

(3) *There is the proof of Jacobi, that the tonsil does not absorb the toxin of diphtheria.*

(4) *There is the proof of Von Levinstein, that the groups of acinous mucous glands in the well-*

known figure by *Luschka*, of the faucial tonsil does not belong to the faucial tonsil proper, but to its neighborhood.

(5) *There is the proof of Frederici and Goerke* that the tonsils are infected via the blood. If colored particles are injected into the veins, they appear in the tonsils.

(6) *There is the proof of Von Lénárt*, of the statement of *Fränkel*, that micro-organisms absorbed from a wound in the nose are carried via the lymphatic circulation into the tonsil.

"Science owes a great deal to the reasoning power of the thinker, and to the acumen of the guesser, but both are alike futile until facts are accurately determined." (*Halliburton.*)

IF THE FAUCIAL TONSIL

(1) Does not possess a protective mechanism; (2) does not have a phagocytic function; (3) does not have a haematopoietic function; (4) does not have an internal secretion; (5) does not absorb infections, *then*

WHAT DOES IT DO, IF ANYTHING? HAS IT A RIGHT TO EXIST? or, IS IT AN ATAVISM?

Do the theories of Brieger, Gulland, Allen, Masini, and Stöhr, cover the entire range of investigation that pertains to the usefulness of the faucial tonsil? Are the unproved hypotheses of these learned searchers to be accepted as a finality, and their results permitted to hinder other research? Surely not. Retterer, Labbé, Sirugue, Stöhr, Gulland, Allen, Masini, Von Lénárt,

Broeckaert, Poli and Von Levinstein, may be considered to have gathered all possible data within the range of their investigations; but there are other fields open to investigation, which may elucidate the functions of the faucial tonsil. Not alone the biologist, the physiological chemist, the pathologist, the bacteriologist, the anatomist, and the surgeon, are to be consulted in regard to the function of the faucial tonsil, but considering these in one group, as that of medical men, there are three other groups, that may contribute to our knowledge, namely; voice mechanicians (physicists, phoneticians, and acousticians), voice trainers, and voice users.

In consideration of the sterility of biological and physiologico-chemical laboratory research, pertaining to the function of the faucial tonsil, I question the wisdom of classifying this organ as a component part of the *Waldeyer lymphatic ring*, BECAUSE,

(1) *It lacks the most ordinary and essential features of the lymphatic structures, and of the tonsils that compose the ring.*

(2) *It possesses important mechanical, acoustic and phonetic functions which are not possessed by any other body of the ring.*

The mechanical functions and mechanical affections of the faucial tonsil are nowhere mentioned in medical textbooks. But they receive attention in the literature of the voice profession.

Observing carefully the remarkable anatomical situation of the faucial tonsil and its suspended position in the very center of a framework of curious, active and important muscles, it be-

comes pertinent to ask whether it has mechanical functions, and whether it is subject to mechanical diseases?

In many respects the faucial tonsils resemble and are as soft as the cartilages of the larynx and trachea. They impart firmness to the pharyngeal walls. They evidently serve a purpose that hard, unyielding, osseous formations in their situation would not serve. They are mobile and compressible.

The position of the tonsils changes rapidly and with great facility, thereby adding vastly greater measure to their mechanical usefulness.

Their consistence, shape, size, position, presence or absence give structural variation to the resonance cavities, and create, as well as determine, differences in individual timbres of the voice.

They play a role in tone formation; and they must be considered.

The muscles of the fauces attract attention when at rest, by the remarkable bowed or arched appearance which they assume. They straighten when they contract. Therefore, I consider it most reasonable to believe that on account of its position between these bowed muscles, *the faucial tonsil acts as a fulcrum over which these muscles play.*

John Howard, "Physiology of Artistic Singing," states:

"It is true that a muscle's contraction consists in an effort to shorten itself. If the muscle, before contraction, has the form of a curve, then its contracting effort will shorten it to a straight

form, before it pulls upon its points of attachment."

"If the two bodies to which the ends of the muscle are fastened are by some other force pulled farther apart, with a power greater than the contracting force of the muscle, then the muscle may still contract, or put forth its effort to shorten itself, although at the same time it is being actually lengthened. In this case, which is constantly occurring in vocal performances, the muscle actually loses in thickness, and becomes more slender during its own contraction."

"If a muscle embraces in its curve any yielding part, it will, in its effort to draw itself straight, push this yielding part out of its straightening way, thus exerting a lateral or sidewise force, as well as that longitudinal or lengthwise force which draws its points of attachment nearer together."

"Even if the embraced or curved-about part is too firm to be actually displaced by the sidewise push of a curved muscle, yet this part will be pushed upon and made more solid or dense. In this case the muscle will pull more or less strongly the more or less firm and unyielding the enclosed part may be."

"Whenever an arched faucial muscle straightens, the tonsil is either pulled or pushed. It is drawn inward toward the median line of the mouth, by the palato-glossus muscle, which curves outward while at rest. The palato-pharyngeus muscle, also, upon contracting and straightening, draws the tonsil inward. These palate-tongue muscles cannot have put forth

their tongue supporting effort, if the tonsil remains unmoved instead of moving inward. The tonsil is pressed toward the median line by the superior constrictor of the pharynx."

It is also pressed downward and inward between the pillars of the fauces in the act of swallowing.

"It has been shown that the inward straightening of the outward-curving part of the superior constrictor, which extends from the side of the tongue to the middle of the rear wall of the pharynx, was one of the three agents which could hold up the tongue. If the internal pterygoid muscle, just outside, is relaxed, it will be so loose that it will readily follow the inward-moving curve of the glosso-pharyngeus muscle and the higher division of the superior constrictor, outside of which it runs. But if it is held stiff by contraction, it will not yield, and may prevent the free inward straightening of the curve, thus interfering with the vocal action of the tongue, supporting the glosso-pharyngeus (tongue part of the superior constrictor)."

"Possible proof of this interference is afforded by touching one of the tonsils and then trying to bring it inward at first with, and then without, jaw setting or stiffening, when it will be apparent that the inward movement of the palato-larynx muscle is in some way (probably in this) checked to some extent during the jaw stiffening; for upon relaxing the jaw effort, the tonsils come nearer together with less vocal effort."

"There can be no doubt that the palato-glossi muscles raise the tongue after having straight-

ened themselves. It is also clear that they can draw the soft palate downward."

"Push the end of a finger backward in the mouth over the lower teeth, till you press lightly against a smooth, lumpy mass, the tonsil; now sing a tone, and know that you are so far right, if this fleshy mass is drawn inward toward the middle of the mouth; wrong if it does not move inward."

"This mass, the tonsil, is drawn inward by the palato-glossus muscle which here curves outward while relaxed, and necessarily straightens inward drawing inward the tonsil."

"These palate-tongue muscles cannot, then, be putting forth their tongue-supporting effort if the tonsil remains unmoved."

"The tonsil may also be drawn inward by the palato-pharyngei muscles."

There is an infinitely varied and ceaseless play upon the faucial tonsils by the muscles of the fauces, pharynx, larynx, mouth and jaw.

In this connection, mark well—that the fibrous capsule of the faucial tonsil is the point of insertion of muscular fibres derived from the superior constrictor muscle of the pharynx.

Why are muscular fibres from the superior constrictor inserted into the tonsil? Is the insertion of these fibres in a soft and movable body like the tonsil, designed to give freer action, and to facilitate some special play upon the part of this muscle? Does the yielding tonsil serve some function to the superior constrictor, which insertion in a bone would not? And has the action of the superior constrictor led to the development of

the tonsil with its strong aponeurotic sheath? These questions remain to be solved.

The faacial tonsil is a *fulcrum* for the muscles of the pharynx. It is also a *compressible* and a *movable* fulcrum.

The faacial tonsil is a *muscular compensator*, which supplies compensation by change in its *position*, and by change in its *pressure*, and by change in its *shape* when compressed.

Also, by its *presence*, it fills a cavity, which, if unoccupied, would cripple compensation. It's an *idler*.

Acting as a fulcrum, as a compensator, as an idler, and by change in its shape when compressed, the faacial tonsil is an important factor in assisting the muscles and in the shaping and re-shaping of the walls of the pharynx.

The normal tonsil is a normal part of the mechanism that engages in voice production, and the removal of the tonsil will derange and damage the mechanism.

It is stated by *Von Chiari* that "in elder professional singers, in whom the tonsils are enlarged to a great degree, and press apart the faacial arches, extending them very much in the course of years, the tonsils act as a prop in supporting the soft palate; the muscles of the faacial arches become insufficient, while the arches remain tense, being supported by the big tonsils. If these tonsils are removed to the bottom of the sinus tonsillaris, the faacial arches will lose their support, and the whole back part of the roof of the mouth will sag down, affecting the voice permanently."

Howard states: "The soft palate may be

roughly compared to a tongue which has its root at the rear edge of the hard palate, and after extending backward turns its tip downward, leaving a small space unfilled between its downward curved part and the spine, or rear wall of the pharynx."

"On both sides of it, the four pairs of muscles which really constitute nearly its whole substance, start out; two stretching upward and two downward. The two downward ones are the palato-pharyngei and the palato-glossi. The two upward inclined pairs must be examined in search of the forces which can hold up this unsupported tongue-like palate against the down-pulling muscles just mentioned."

"For, if this support fail, the whole chain of muscles, from palate to breast bone, will be, in a sense, let down, enfeebled by being shortened, and withheld instinctively from even making the effort still possible, from fear of undue straining upon a tender, unsupported fleshy mass."

It is impossible to conceive of any calamity that would, with more certainty, permanently destroy the singing voice.

Howard says: "To the anatomist or the physiologist, the surgeon or the general practitioner, no smallest part of the whole throat can seem unimportant. *Baron Cuvier* said that 'not only the muscles of the larynx serve to modulate the voice, but also those of the hyoid bone, tongue and veil of the palate, without which one could not attain the degree of modulation necessary for singing.'"

I have presented the foregoing data to show the mechanical relationship and influence of the

action of certain muscles upon the faucial tonsil, and to form a groundwork upon which I will place evidence in support of the following statements:

- (1) *The faucial tonsil plays an important role in the mechanism of voice production.*
- (2) *The mis-use of the voice by an incorrect method in singing or speaking acts in a mechanical way in causing enlargement, or disease, of the tonsil.*
- (3) *Tonsils enlarged, or diseased, through a wrong method of voice production, may be cured by the substitution of a correct method.*
- (4) *Tonsils that are swollen, tender and painful, caused by the mis-use of the voice, will, in turn, by their abnormal condition, hinder the proper action of the voice mechanism, and this hindrance will be relieved by proper use of the voice.*
- (5) *Removal of the normal faucial tonsil interferes with the mechanism of the voice.*
- (6) *The presence of the faucial tonsil being essential as a factor in voice mechanism, its absence necessarily interferes with the perfect action of the mechanism and is necessarily inimical to the formation of a good singing, or public-speaking, tone.*
- (7) *The mere absence of the normal faucial tonsil impairs and weakens—and the presence of adhesions, scars, and contractions incidental to its removal, interferes with—the mechanism of the voice.*

(1) *The faucial tonsil plays an important role in the mechanism of voice production.*

The faucial tonsils assist in regulating the action of the faucial pillars. As muscular compensators, they undoubtedly act upon and change, direct or interfere with, the course of the vibrations of sound. They contribute to altering the timbre of the voice. They help to sustain the tone.

Alexander Graham Bell says: "Every change in the shape of the passage way, through which the voice is passed, occasions a corresponding change in the quality of the voice."

Manuel Garcia says: "Every sound of the voice may assume an infinite variety of shades apart from intensity. Each of these is a timbre. The path of the sound being formed of elastic and movable parts varies the dimensions and forms in endless ways, and every modification, even the slightest, has a corresponding and definite influence on the voice."

Van Baggen says: "The faucial tonsils play an important role in phonetics. Their situation in the mouth at a place where the voice receives an essential part of its specific qualities allows us to admit this assertion. The muscles of the anterior and posterior fauces between which the tonsils rest are in constant movement when speaking or singing. Their action, combined with the movements of the muscles of the soft palate, changes the shape of the voice passage at the back of the mouth when we are forming the different vowels or producing tones of different pitch. The position of the tonsils, situated as they are between the fauces, are of great importance with

regard to the exactitude and perfectness of these movements."

"Also for the resonance the tonsils are of great interest for the voice. With their spongy tissue they can be compared to the felt in the piano which softens the tone and regulates the resonance. The quantity and quality of the accessory tones depend on the shape of the resonance cavity. By modifying the shape of the resonance cavities, tones of different qualities and in different quantities are put in co-vibration by the vibration of the keynote. The mis-use of the accessory tones is frequently the cause of a husky and impure voice."

Moure: "From a phonetic point of view, the normal role of the tonsils must evidently be to prevent in a certain measure the nasality of tone by maintaining the pillars in the midst of which they are placed."

Lamperti: "The tonsils are most necessary for modulation in singing; without them it is very difficult, sometimes impossible, for the voice to modulate. They assist in expanding and withdrawing the tones—in crescendo and diminuendo. The tonsil is as necessary for the modulation of the voice as the nostril is to breathing."

Mme. Luisa Cappiani: "The tonsils are necessary to the acoustics of the voice. They support the tone in crescendo and decrescendo. Without tonsils, you cannot always strike, and you never can sustain the singing tone; it fades away. With the tonsils in the natural position, of the head, it is much easier to bring the tones into the sound-

ing board, the nasal bridge where the voice becomes mellow and sonorous."

Escat: "The pharynx in its entirety plays in the emission of the singing voice, the role of a powerful resonating box."

Mme. Alice Garrigue Mott: "Normal faucial tonsils preserve the original structure of the throat, on which depends the beauty of the individual voice."

Frank E. Miller: "It is especially the structural differences between the resonant cavities of individual singers that determine differences of timbre or quality. There are innumerable timbres for the human voice, as many as there are voices, and all due to the pliability of the vocal tract. The walls of the pharynx are permeated by a network of muscles, susceptible of numerous adjustments and re-adjustments in size and shape. The vocal tract of an accomplished singer is capable of some 16,000 adjustments and re-adjustments, as many changes as a sensitive face is of changes in expression."

"There are seventy-four muscles and sixteen nerves capable of influencing various points of the vocal apparatus, and by an arithmetical progression we arrive at the enormous sum of 74,682,000 possibilities of different combinations in the action of these muscles."

"That is, granting that they have individual and conjoint action and do not act in pairs, we have the gigantic possibilities of 74,682,000 alterations in the vocal mechanism. For every tone produced, there is a special adjustment throughout the entire vocal tract."

One may well conceive the ease and certainty with which such a mechanism will become deranged by the removal of a tonsil. It will alter the entire mechanism.

(2) *The mis-use of the voice by an incorrect method in singing or speaking acts in a mechanical way in causing enlargement, or disease, of the tonsil.*

An incorrect method of voice production deranges the voice mechanism. Expert laryngologists, and experienced voice trainers, are familiar with the results of a bad method. These results with their causes are noted in works on the voice, and have been recognized for a long course of years.

Tosi, in his "*Observations on the Florid Song, 1723,*" states: "When a teacher obliges the scholar to hold out the semibreves with force on the highest notes, the consequence is that the glands (tonsils) of the throat become daily more and more inflamed, and if the scholar loses not his health, he loses the treble voice."

Van Baggen, in the *Medical Record*, New York, January 5, 1907, states:

"Every specialist for throat diseases knows that many of the sufferers from those affections are to be found among those whose profession demands constant use of the voice. It is obvious that the mis-use of the voice is in most cases the cause of the affliction."

"Patients present the following characteristic symptoms: catarrh of the pharynx and of the larynx, with congested and swollen mucosa; pillars of the fauces are swollen and often highly

developed; paresis of the vocal cords which are red or yellow in color, and which do not close well. Paresis of the vocal cords is mostly united with paresis of the anterior cricothyroid muscle, the internal thyro-arytenoid muscle, and the lateral crico-arytenoid muscle. In some serious cases, a swelling of the ary-epiglottic ligament is observed. The fault is purely functional."

Mme. Emma Seiler, in her work on "*The Voice in speaking*," says:

"By false training, an artificial and unnatural way of speaking has been formed by many of our orators and singers. The result is that the vocal organs very often become diseased. The mucous membrane of the pharynx becomes dry and a peculiar huskiness of the voice occurs. The epiglottis becomes swollen and injected. The arytenoid cartilages become swollen and inflamed. The vocal cords become reddened and thickened. A slight paralysis of the cords is sometimes present. The mucous membrane of the trachea becomes congested and thickened. These are the conditions of the parts in typical cases of this disease. But all the symptoms may be aggravated in severe cases where, sometimes, the ulcerations extend into the trachea and up into the nasal cavities, involving the Eustachian tubes and the middle ear in a general sub-acute inflammation. The real cause at the foundation of the disease consists, not in a long-continued use of the vocal organs, *but in a faulty way of using them.*"

"Straining of the tensor muscles of the larynx, with added pressure of the expiratory muscles

reddens and inflames the edges of the cords and the whole lining of the larynx."

Shakespeare, London, 1912, says: "I suspect that most swollen tonsils are the result of a rigid manner of using the voice, both in singing and speaking."

Charles A. Rice states that: "Nothing will enlarge the tonsils so quickly as bad placement of the voice. Not only are the tonsils enlarged, but the intrinsic muscles are often impaired, and sometimes this extends to a paralysis of the arytenoides. Then the tonsils are removed, with little or no relief, for the trouble has not been with the tonsils, but caused by strain on the entire vocal apparatus."

Enlargement of the tonsils, caused by mis-use of the voice, may lead to mechanical interference with both deglutition and phonation.

(3) *Tonsils enlarged, or diseased, through a wrong method of voice production, may be cured by the institution of a correct method.*

When tonsils are enlarged, or diseased, through mis-use of the voice, it is plainly evident that the only proper way to cure them is by removing the cause. Tonsils enlarged, or diseased, by mis-use of the voice should not be enucleated.

Mme. Lilli Lehmann states: "I never would advise the removal of anything from the throat (of a singer) and would always try to cure it without any operation. I am quite sure that every bad standard of health in the throat can be cured by learning how to use the right method. Singers who sing well will never be troubled by anything."

Mme. Emma Seiler says: "The present inability to preserve the voice is the consequence of a method of teaching unnatural, and therefore, imposing too great a strain upon the voice. Voices which by this overstrained and unnatural way of singing have become worn-out and useless may by correct, proper treatment recover; and even those chronic inflammations of the larynx which are so difficult of treatment may be cured by a *natural and moderate exercise of the voice in singing.*"

(4) *Tonsils that are swollen, tender and painful, caused by mis-use of the voice, will, in turn, by their abnormal condition, hinder the proper action of the voice mechanism, and this hindrance will be relieved by the proper use of the voice.*

In cases of this character, the removal of the tonsils is a blunder.

(5) *Removal of the normal faucial tonsil interferes with the mechanism of the voice.*

Lermoyez declares that "the normal, faucial tonsil is an organ that must be respected. The normal tonsil should never be removed more than a normal eye or a normal tooth."

Manuel Garcia and *Mme. Viardot-Garcia* "always protested against any surgical, or other artificial means for improving the natural voice."

Lamperti states that "If the tonsils are *normal*, they should on *no account* be removed, as the removal will *never* improve the voice. In almost all cases when tonsils were removed, I have found in the fifty years of my teaching, that the voice is injured, often beyond remedy."

Richard Loewenberg says: "To prevent mis-

understanding, by normal tonsils, I mean tonsils of a healthy color, those not enlarged in length or thickness, and showing no evidences of chronic inflammatory processes. Such tonsils should, according to my experience, never be removed by operations, neither on account of the effect upon the general health, nor of the functional activity of the organ itself. Even though the physiological significance of the tonsil still rests upon a hypothesis, this, like any other healthy organ in the body, should be left undisturbed. I do not know of any case in which a singer's voice was improved by removal of normal tonsils. On the contrary, I know of cases in which the removal of normal tonsils has caused permanent detrimental effects to the voice, in consequence of the unavoidable injury to the arches of the palate (adhesions scar, tissue, etc.)."

"For these reasons, I disapprove of operations upon normal tonsils in all cases."

Sebastiani states: "Often the voice has been damaged if the operation on the tonsils was not necessary, but simply performed to increase or improve the voice. In similar cases, the voice has been damaged and sometimes *entirely lost*. Such operations on so delicate an organ as that of the voice, are not good for the clearness, exercise, color and facility of the voice. The tissues, nerves and muscles always remain depreciated after an operation that was not compulsory to avoid greater damages. I would not advise the removal of normal tonsils in singers. The benefit that can be derived by excision of the tonsils, if of great utility in cases of hypertrophy to avoid

greater damages, may be of some benefit to the human voice in *general*; but it may not be of any benefit to *specialized organisms endowed with exceptional and valuable voices*. *In these cases of exceptional and valuable voices, any surgical operation whatsoever, it matters not how perfect, can harm the precious instrument.*"

"I have been able to verify that the greater the development of the tonsils, the more difficult is the resonance and the emission of the tones of the second register or high notes: even the removal of the *normal tonsils does not facilitate these high tones.*"

Mme. Cappiani states: "I know of *no* instance in which the singer's voice was improved after removal of the tonsils. But the voice may be changed to higher or lower pitch. Often the compass may not be changed at all; only the sounding quality become more ordinary."

Mme. Von Klenner states that after removal of the tonsils she "has always found a certain lack of sweetness in the tone quality, and difficulty in supporting the tone in certain registers."

Hubbard states that "removal of the tonsils causes a difficulty in assuming different shapes of the pharynx necessary in singing, causing a hardness in quality and laborious action."

Mme. Schumann-Heink states that "in some cases the voice becomes acid, uncertain, weak or rough, or entirely ruined after removal of the tonsils."

Bispham remarks that "there is always trouble after operations on the throats of singers; that after removal of the tonsils there is always some-

thing gone which contributed to the good singing tone."

Mme. Clara Kathleen Rogers declares that "the tonsils are factors in forming the perfect resonator."

Mme. Alice Garrigue Mott states that "the tonsils preserve the original structure of the throat, on which depends the beauty of the individual voice."

Von Schrötter (Vienna), *Von Chiari* (Vienna), *Schmiegelow* (Copenhagen), *Van Baggen* (The Hague), *Lubet-Barbon* (Paris), *Semon* (London), *Massei* (Naples), *Escat* (Toulouse), *Moure* (Bordeaux), *Lermoyez* (Paris), *Fränkel* (Berlin), *Von Levinstein* (Berlin), *Brieger* (Breslau), *Goerke* (Breslau), *Loewenberg* (Berlin), *Marage* (Paris), *Castex* (Paris), *Gleitsmann*, (New York), *Barth* (Leipzig), *Luc* (Paris), *Miller* (New York), *Lamperti* (Berlin), *Shakespeare* (London), *De Reszke* (Paris), *Sebastiani* (Naples), *Sabatini* (Milan), *Mme. Lilli Lehmann* (Berlin), *Mme. Luisa Cappiani* (New York), *Mme. Alice Garrigue Mott* (New York), *Mme. Schumann-Heink* (New York), *Mme. Lillian Nordica* (New York), *Mme. Luisa Tetrazzini* (New York), *Bonci* (New York), *Bispham* (New York), and all other authorities, without exception, advise against the removal of normal tonsils.

(6) *The presence of the faucial tonsil being essential as a factor in voice production, its absence necessarily interferes with the perfect action of the mechanism.*

(7) *The mere absence of the faucial tonsil im-*

pairs and weakens—and the presence of adhesions, scars and contractions incidental to its removal, interferes with the mechanism of the voice.

The presence of the faucial tonsil having been shown to be absolutely necessary to artistic singing and public speaking, is it not reasonable to think that its mere absence will, at times, account for deterioration in tone?

The absolute certainty of impairment of the voice which follows removal of the tonsil, I have shown to be well known to the voice profession.

The phonetic value of the tonsil is proved by the phonetic defects which always follow after enucleation.

For every tone produced there is a special adjustment throughout the entire vocal tract. How, then, can enucleation fail to alter the mechanism?

"The faucial tonsils are absolutely necessary in the modulation of the singing voice." (Lam-perti.)

"The tonsils regulate pillar action." (Miller.)

"They modulate the voice. They soften the tone and regulate resonance. They assist in changing the shape of the pharyngeal cavity, and the pitch and quality of vocal tone." (Van Baggen.)

"They prevent, in a degree, the nasal tone of voice." (Moure.)

*"Excision of the tonsils, if of great utility in cases of hypertrophy to avoid greater damages, may be of some benefit to the voice *in general*: it *may not be of any benefit to specialized organisms, endowed with exceptional and valuable**

voices, these voices being of great value precisely on account of their mucosae; for the softness of the muscles and nerves; for the perfection of the different cavities of resonance; finally for the marvelous structure of all the vocal passage. Then in these uncommon conditions any surgical operation whatsoever, it matters not how perfect, can cause harm to the precious instrument. Often the voice has been damaged if the operation on the tonsils were not necessary, but simply performed with the desire to increase or improve the voice. The voice has been damaged and sometimes entirely lost. It is not well for the clearness, exercise, color and facility. The tissues, nerves and muscles always remain depreciated from an operation that was not compulsory to avoid greater damages.” (Sebastiani.)

“When removed, I have always found a certain lack of sweetness in the tone quality and difficulty in supporting the tone in certain registers.” (Mme. von Klenner.)

“After removal of the tonsils the voice permanently loses much of its personal quality. The tone seems dispersed, and lacks the usual brilliancy of resonance.” (Mme. Marie Everett.)

“Removal of tonsils causes a difficulty in assuming different shapes of the pharynx necessary in singing, causing a hardness in quality and laborious action.” (Hubbard.)

“They preserve the original structure of the throat, on which depends the beauty of the individual voice. I know many cases where the removal of tonsils has made a change for the worse in quality.” (Mme. Mott.)

A troublesome tonsil should never be removed if the affection from which it suffers is disease which arises from a mechanical cause and which disappears when the cause has been removed.

I have proved that the tonsil plays an important rôle in the mechanism of voice production; that the mis-use of the voice causes enlargement, or disease of the tonsil; that enlargement or disease of the organ may be cured by correct use of the voice; that swollen, tender and painful tonsils hinder the normal action of the voice mechanism; that removal of the normal faucial tonsil *always* affects the mechanism and *always* injures the quality of voice; that the presence of the faucial tonsil being an essential factor in the voice mechanism, its absence necessarily interferes with the perfect action of the mechanism, or, in other words, *any interference with the mechanism of the voice leading to, or caused by, mechanical affection of the faucial tonsil, will become a positive and permanent injury, if the tonsil is removed; that such an egregious blunder as the removal of an integral part of the mechanism of the voice cannot possibly be atoned for.*

Precious voices have the most delicate mechanism; the more delicate the mechanism, the more easily it is thrown out of order.

The natural mechanism of the voice can never be improved by surgical means. The throat of the voice user requires more consideration and less treatment than any other throat.

There are no opportune times at which a voice user's throat requires radical treatment, or sur-

gical operation, with any assurance of improving the voice.

Hyperplasias. Enlargement of the faucial tonsil may be temporary, or permanent. Enlargement is due to a great variety of causes, and presents many structural variations. Differential diagnosis of the various forms is essential for the proper application of treatment. Diagnosis is of no value to those alone who consider it of no importance, or who minimize it in favor of ablation.

Under a variety of conditions, cells, larger parts of the body, or entire organs become larger than normal. The structural change may be a simple increase *in size* of the elementary structure of the part, the cells. This is *simple hypertrophy*. It is usually associated with some increased functional demand upon the cells and an increase in their functional capacity.

On the other hand, in many cases the increase in size of a part or organ is due not only, or not at all, to the increase in size of its elementary structures, but to an increase in their *number*. This increase in number of the structural elements of a tissue or organ is called *numerical hypertrophy*, or *hyperplasia*.

Simple hypertrophy and hyperplasia are frequently associated.

Simple enlargement of a part or organ does not necessarily involve hypertrophy of any of its structural elements. It is well to limit one's conception of hypertrophy to enlargement of specific structural elements of a part with maintenance or increase of functional activity, and to consider

other instances, as increase of fat in a muscle, or waxy degeneration of the liver, as examples of pseudo-hypertrophy.

Compensatory hypertrophy of the *thyroid* and *adrenals* has been *experimentally* induced.

In most of these conditions hyperplasia of the interstitial tissue is associated with parenchyma hypertrophy of the specific parenchyma cells whose response to increased functional demands is marked by simple hypertrophy.

Lymph-nodes, in addition to considerable hyperplasia due to inflammation, also become enlarged under a variety of conditions which we do not understand. This lack of knowledge of the etiology, together with our ignorance of certain functions of the lymph-nodes, and the morphological similarity, or even identity, which these enlarged nodes present under various conditions, render it very difficult to decide upon the exact nature of the change, and in many cases to distinguish one form of enlargement from another.

Acute inflammation of the tonsil shows an increased infiltration with leucocytes, which causes enlargement, also increased amount of lymph in the intercellular spaces.

Congestion by lymph, or increase in adenoid tissue, are not the only reasons for enlargement.

So many of the most profound thinkers consider enlargement of the tonsil to be sometimes symptomatic of, or associated with, in some way, the growth of the individual, that it is wise to respect this observation. It is well to heed *Escat*, who is "of the opinion that the faacial tonsil has not for its only function that of phagocytosis as

studied by *Metchnikoff*, but also a physiological and biological function due to an internal secretion."

"I claim, in accord with the opinion of *Allen*, that the tonsil secretes a principle which we are as yet unable to determine, but which should be useful in the development and growth of the subject, and probably to the growth of the skeleton. I have found a reason for this in the fact that the normal tonsils atrophy normally at about the age of 18 to 20 years, *from the time that the subject has become fully an adult.*"

Brieger states that:

- "(1) Enlargement of the tonsil by lymphatic scrofula has not been proved.
- (2) Clinical aspect is conditioned by tuberculosis in a certain number of cases.
- (3) In very rare cases the hyperplasia is produced by lues.
- (4) Hyperplasia of the glands appears in the whole lymphatic apparatus accompanying enlargement of the tonsils.

These four represent only a minority of the cases.

Generally they are very healthy people who have enlarged tonsils."

According to *Grober*: "The tonsils seem to be a less favored settling place for tubercle bacilli than the lymph glands, for we find scrofulous glands oftener than infection of the tonsils. Many authors consider diseased tonsils as more liable to microbial infection than healthy ones. If that is true, it has not been proved."

"It has been shown that the entrance of mi-

crobes into the system does not always produce the disease. It is important how strong the defensive processes of the body are. Therefore, infectious diseases are mostly constitutional."

Goerke asks: "What are the causes of the involution of the tonsils, and its importance for the organism?

Answer. Involution is an expression of immunity against certain infections especially peculiar to childhood.

(2) What are the microscopic (and macroscopic) changes of the involution?

Answer. Disappearance of follicular tissue, and appearance of indifferent tissue.

(3) How does the final result of involution represent itself histologically?

Answer. As a picture of the normal mucous membrane of the pharynx.

(4) What are the causes that prevent involution, and how do we learn these causes by histologic examination?

Answer. Inflammatory processes, in the upper part of the pharynx, or in the tonsil itself.

(5) What picture represents the tonsil not completely involved?

Answer. By changes connected with inflammatory processes.

(6) How will therapy be directed?

Answer. As we are not able to bring about involution of the tonsils in adults, the tonsils must be removed by operation."

Goerke states: "After operation, the tissue regrows, and in this way seems like a lympho sarcoma."

"Tuberculosis is of no importance as regards hyperplasia or return of the growth. The adenoid tissue regenerates in all cases, after removal of the tonsil. Those same causes which led to the first hyperplasia also lead to the new hyperplasia. These recurrences occur more often than we think, but we do not know about them. Patients don't speak about the return, because they don't want to be operated on again. The regrowth is never as great as the first hyperplasia."

Grober says: "It is not possible to remove the entire tonsil."

Marage says: "Lymphoid tissue always escapes in surgical intervention no matter how well it is done."

Von Levinstein says: "Its total removal is not possible."

Escat says: "Even in the most radical ablation of the tonsil, there is always left a little adenoid tissue. It is not necessary, in my opinion, to set one's heart upon completely extracting all the tonsillar tissue as various American confreres proposed. The tonsil is not a cancer! After ablation, a kind of anaemia or weakness, a cachexia tonsillipriva, has sometimes occurred."

Moure and *Escat* state that "the lingual tonsil sometimes overlaps and becomes blended with the faucial tonsil."

Truth demands a record of the statement, noted by many excellent observers, that a new growth occurs at the seat of the tonsil, after that organ has been removed. So constant is the occurrence of this new growth that it must be considered as the result of a natural, sequential,

physiological process. The growth must perform some physiological function, for nature never serves a useless purpose.

Lennox Browne says: "Beyond any question, there is a tendency not of recurrence but a continuation of the growth."

Von Levinstein says: "Eradication of the tonsil can never be completely done. A total and lasting destruction of the tonsillar tissue is, as *Goerke* has proved, absolutely impossible, for it regenerates always."

Brieger, Wright, Semon, Mackenzie and Grayson agree with Goerke, Grober, Levinstein, Escat and Browne.

Jacobi says: "It is not a matter of indifference whether the capsule of the tonsil is removed or not. Infection through the capsule is rather difficult. The capsule is a protection to the blood and lymph circulation."

The capsule is a barrier in preventing the extension of disease from within the tonsil to neighboring tissues in its vicinity. The capsule is a barrier in preventing the extension of disease to the body of the tonsil from the outside neighborhood.

The capsule protects the tonsil against external injury. It adds solidity to the structure of the tonsil, and contributes a degree of firmness to the faucial wall.

I view the tonsils as BUFFER ORGANS. They are buffers. From their plainly visible action, I would call these bodies FAUCIAL CUSHIONS. They are cushions. They undoubtedly serve as cushions to the pharynx. They

are mechanical cushions. They are acoustic cushions.

The act of swallowing involves consideration of the faucial tonsils. In the act of swallowing the upper part of the tonsil is pressed downward and inward between the pillars of the fauces. The inferior constrictors of the pharynx contract above, upon the morsel of food, and force it downward into the aesophagus. The palato-pharyngeus draws the palate down upon, and the sides of the pharynx in upon, the food, to force it downward. It also aids in swallowing by drawing the larynx upward.

In the act of swallowing, as the mass of food passes through the pharynx, from the mouth to the aesophagus, the side walls of the pharynx approach each other and press upon the passing bolus, imparting to it a slight push downward.

The faucial tonsils occupy the forefront of the push. A morsel of fish containing a sharp bone, when pressed upon, may pierce the tonsil without evil result, without pain, without bleeding. In this way the tonsil acts *mechanically both as a buffer and as a cushion*, and serves to protect the more delicate and important structures of the pharynx and larynx.

If the tonsils are removed, then delicate and important blood vessels, nerves and muscles become exposed. Immediately behind the tonsil is placed the internal carotid artery—the size of a goose quill. Prick that! and you will quickly see what happens. The tonsil protects the internal carotid artery. Its absence menaces this artery. The internal carotid artery is twice threat-

ened by tonsillectomy; first by the operation, and second, by the absence of the tonsil.

"The physiological act of deglutition is sometimes considerably disturbed in affections of the oro-pharynx and of the laryngo-pharynx. Enlargement of the lingual tonsil, acute or chronic inflammation, and tumors at the base of the tongue having their seat in the region of the epiglottic fossettes, where the alimentary bolus is formed at the beginning of deglutition, are, above all, characterized by a *constant sensation of a false alimentary bolus*, which greatly incommodes the patient." (*Escat.*)

In the presence *and also in the absence* of these conditions, I have repeatedly observed *elderly persons incommoded*, and *sometimes choke*, at the *very beginning* of the act of swallowing on account of an *apparent slowing-up in the process of muscular contraction* of the muscles of the pharynx—a sort of semi-paresis. I was once called into consultation in the case of an old gentleman, whose family physician had diagnosed "paralysis of the epiglottis and of the vocal cords," and was about to perform tracheotomy, but in which case I changed the diagnosis to that of *inflammation of the fossettes with abnormally slow muscular action*. He recovered promptly without an operation.

It admits of no question that, sometimes, in elderly people, abnormally slow muscular movements will be made still slower by removal of the tonsils, and that this will particularly follow in cases of removal of unusually enlarged tonsils

which pressed upon, and gave support to, the palatine arches.

Medical authorities have furnished no proof and are entirely undecided regarding any possible physiologic, biologic, or bio-chemical function of the faucial tonsil.

I have presented the evidence and have furnished the proof that the voice mechanicians (physicists, acousticians, phoneticians), voice trainers, and voice users, agree that the faucial tonsil possesses important mechanical, acoustic and phonetic functions.

While I have shown that the faucial tonsil possesses highly important mechanical, acoustic and phonetic functions, I also believe that the anatomy of this organ, with its germinating centers, and with its curious system of closed lymphatic canals indicates bio-chemical and physiologic functions which, as yet, have not been proven.

The learned hypothesis of Brieger and Goerke seems to deserve the high endorsement of Fränkel. And the theory of Allen, endorsed by Escat and other high authorities is surely worthy of further research. Von Lénárt's proof of a direct lymphatic communication between the nose and the tonsil is important. He has also proved an intimate connection existing between the two faucial tonsils. And Poli has shown that the lymphatic region of the two nostrils communicate by anastomotic branches which at the back surround the free edge of the septum and at the front, though to a less degree, by vessels which pierce the septal cartilages.

CHAPTER IV

CAUSES OF TONSIL DISEASES.

A clear understanding of the normal anatomy and physiology of any organ is essential to a clear conception of the cause of the disease that may affect it. Disease is an interruption of function, *not* something new, *not* something added to, *but an interference with physiological action.*

Injury of a cell by bacteria, toxins or other means disturbs its function. Agencies and conditions to which the body has not adapted itself which, swaying its normal capacities now one way and now another, induce the functional alterations by which disease is manifested. It follows from this that the functional abnormalities and the structural alterations which make up the signs, symptoms and lesions of disease involve the expression of no new functional capacities which the normal body does not possess.

The body in disease manifests no new functions, develops no new forms of energy, reveals no new capacities.

In normal physiology attention is most keenly centered to-day upon the structure and performance of cells as the field richest in the promise of significant revelations.

So, also, in pathology by similar methods and with equal persistence must the structure and performance of cells under abnormal conditions be studied if we are to hope with reason for a clearer comprehension of disease.

To the conception of pathological processes as essentially cellular processes are due the great advances which this phase of biological science has made during the past few decades.

When we study the causes of diseases, we should remember always that underlying the manifestations of disease as well as sustaining the correlated processes which we name health, are the complex and ceaseless chemical transformations which in both health and disease alike supply the energy which sustains all expression of life. So that what we are wont to call the senses, whether external or internal, of disease are really not primary causes, but liberating impulses or excitants which sway and modify the orderly transformations of energy constituting health with those manifestations of perturbed function or altered structure, or both, on which our conceptions of disease are framed.

Delafield and Prudden (Text-book of pathology) :

"Pathology, then, deals with the disturbances of function and the alterations of structure in living beings, induced by unusual agencies and conditions."

"The functional disturbances thus induced are embraced as symptoms of disease in pathological physiology, which so largely dominates the scientific activities of the physician; and forms the basis for the practice of his art."

"Furthermore, so much depends upon the metabolism of the body in health and disease that it is to chemistry, both physiological and pathological, that the scientific physician looks most

eagerly for the solution of problems which each day become more numerous and urgent."

A knowledge of the processes of bacterial invasion, of the process of phagocytosis, of the action of opsonins, is essential to the understanding of the causes of tonsil affections. The air we breathe, the food and drink we swallow, are carriers of bacteria, toxins, and other deleterious matters. The nose and mouth are open avenues for invasion.

The presence of pathogenic micro-organisms and other deleterious substances often interfere with the normal condition of the tonsil. Blood serum, and other body fluids, are capable of killing bacteria with which they come in contact. Even more than in the action of living phagocytes the protective agencies are to be sought in the body fluids. The importance of this protective power of body cells and body fluids is not exhausted with their germicidal action. Not less significant is the role which these may assume in the establishment of other phases of immunity. Other exudates, serum, and fibrin may be useful to the individual in the dilution of locally engendered poisons and in their removal from a vulnerable region the fluid may at times be beneficial.

Fibrin, too, by closing inflammatory foci, through temporary adhesions, or by the healing of absorbent surfaces, may limit the extension of the injurious agents. This is the very point that *Jacobi*, in the *Archives of Pediatrics*, insists upon, namely: that where a lesion occurs on the surface of the tonsil, invasion of germs does not take place; first, because of the impaction of the

tissue with fibrin; second, because of the bactericidal influence of the stagnating venous blood. That the regenerations and repair of tissue which may be associated with or follow the more active phases of inflammation are, as a rule, beneficent, is not doubtful. Inflammation is the local attempt at the repair of injury. The fundamental conception upon which this characterization is based is that inflammation is an emergency measure incited by injury, in which the body adapts to unusual ends as best it can mechanisms and processes normally maintained for other purposes. This view of inflammation points the way to a broader interpretation of other abnormal conditions in which also the adaptation of physiological cell capacities to new conditions seems to furnish a clue to many manifestations of disease as yet but little understood.

Delafield and Prudden say: "In the light of the new knowledge of opsonins and their relation to phagocytosis, the recurrence of leucocytosis in various affections becomes of special significance. For if either a local or general leucocytosis be fostered hand in hand with the effective production of opsonins, the conditions would appear to be most favorable for the control of the infective process."

Leucocytes are apt to gather in regions in which micro-organisms are abundant, and are believed to take up and destroy micro-organisms and to prevent further entrance, and possibly the entrance of their products also, into the circulation. The leucocytosis of infectious diseases may be regarded as the effort of the blood pro-

ducing organs to protect the blood and tissues by means of leucocytes against the invasion of micro-organisms and against the actions of toxins present in the circulation. It is quite possible that in the blood stream leucocytes act as scavengers. According to Metchnikoff, leucocytes are manufacturers and storehouses both of immune bodies and complements. Hyperaemia must be viewed as a protective process. Increased blood supply to any part means an increase in the number of leucocytes. Acute inflammation is a heightening of this process, caused by the presence of bacteria, toxins or other noxious matter. Increased blood supply means a flushing of the part with defensive and protective leucocytes, and at the same time sustaining super-nutrition under conditions of distress. The inflammatory exudates are salutary in that they clean the tissues and wash away bacteria, toxins and other debris. The object of inflammation is always salutary. Acute hyperaemia and the flow of secretions should be encouraged, not interfered with.

The new light upon inflammation bears with particular force upon the infections of the region of the tonsils, peri-tonsil, adenoid structures, the nose and mouth. *Westenhoeffer* has proved that the germs of cerebro-spinal meningitis enter the system by way of the nose and through the pharyngeal tonsil, after the protective power of that tonsil has been broken down by the superior force and the virulence of the invading germs.

Fränkel's statement that the faucial tonsil becomes infected from the invasion of germs from

the nose by way of the lymphatic canals has been proved by *Von Lénárt*.

The faucial tonsil becomes diseased from six common sources:

- (1) *Primary*, by infection from the mouth, or continuity of surface.
- (2) *Secondary*, from the nose, via the lymphatic vessels.
- (3) *Symptomatic*, representing general blood disease, etc.
- (4) *Reflex disease*, or sympathetic, from dental caries, nasal affection, etc.
- (5) *Mechanical*, due to pressure, false method in using the voice, etc.
- (6) *Hyperplastic*.

CHAPTER V

CLASSIFICATION OF TONSIL DISEASES.

Anatomical and clinical considerations are both essential in a practical classification of tonsil diseases. The anatomy must be kept in view. The processes of bacteriology teach us that wherever a specific infectious micro-organism is to be found, the disease belongs to that organism. No matter what organ or anatomical structure is affected, if the bacillus tuberculosis can be demonstrated, it is always tuberculosis. Present knowledge of infectious processes has already proved of great advantage, both theoretically and practically; treatment is surer, prevention more certain, and mortality is greatly lessened. But we are still ignorant of a great number of infections and of infectious processes. Infective micro-organisms are varied and numerous and every year adds to our list of new diseases of hitherto unsuspected character. Physiological chemistry is constantly adding new poisons and reactions, while the sclerotic and hyperplastic processes have much to reveal.

Diseases of the faucial tonsil may be conveniently divided into six classes: (1) *Primary*, (2) *Secondary*, (3) *Symptomatic*, (4) *Reflex* or *Sympathetic*, (5) *Mechanical*, (6) *Hyperplasias*.

(1) *The PRIMARY diseases* are those that affect the mucous membrane covering the surface of the tonsil and lining the fossulae or crypts,

namely: *acute inflammation of fossulae*—synonyms—acute tonsillitis, acute lacunar tonsillitis, infectious tonsillitis, acute follicular tonsillitis, cryptic tonsillitis; *acute ulcerative lacunar tonsillitis*, herpetic tonsillitis, membranous tonsillitis; *chronic inflammation of fossulae*; *lacunar calculus*—synonym, tonsillith; *hyperkeratosis*—synonyms, lacunar hyperkeratosis, mycosis leptothricia; *actinomycosis*; *pseudo-membranous tonsillitis*; *diphtheria*; *tuberculosis*; *lupus*; *specific*.

(2) *SECONDARY diseases* affecting the interior of the body of the tonsil, as infections from nasal catarrh, and nasal trauma via the lymphatic vessels: secondary infection of the body, and also of the mucous membrane covering the surface, from inflammation or abscess, in the peritonsillar tissues.

(3) *SYMPOMATIC diseases*, due to infection of the blood, tuberculosis, lues, exanthema, typhoid, rheumatism, etc.

(4) *REFLEX diseases*, pain, tenderness, swelling, from eruption of teeth, nasal affection, etc.

(5) *MECHANICAL diseases*, pain, tenderness, swelling, etc., from false method in using the voice, mechanical pressure, etc.

(6) *HYPERPLASIAS*, temporary, from augmented physiological function, absorption of nasal trauma, etc.

Permanent hyperplasia from increase of adenoid tissue, from tubercular and other infections via the lymphatic vessels, and also via the general blood current, etc.

Papilloma, most common growth. *Lipoma*, rare. *Angioma*, rare.

Fibro-enchondroma, rare. *Cystoma*, rare. *Lymphadenoma*, rare.

Atrophy, common. *Hypertrophy*, common. *Submerged tonsil*, common.

Carcinoma, more malignant than *sarcoma* and equally rare.

CHAPTER VI

ADENOIDS.

A bright, beautiful, blue-eyed little girl went running home from school one day, in great alarm, to tell her mother that the school doctor had examined her and had told her that she "had adenoids and tonsils and unless they were taken out she would get an awful disease." "I was so frightened," she said, "that I cannot remember the name of the disease the doctor told me I would get; but I am sure he said either two berculosis or three berculosis."

A lad of twelve years told me that the school doctor had examined him. "He put a stick in my mouth, and said 'You have one large tonsil and catarrh in your nose.' The doctor had four sticks. He examined seventy-five in our school; two were normal and seventy-three were abnormal."

A physician of over twenty-five years' experience, a graduate of the University of Pennsylvania, called upon me to examine his throat. He remarked about adenoids. I asked him the question: "What do you mean by adenoids?" After some hesitation, he replied, "Adenoids is an enlargement of the lymphatic tissues. I think that is what they are. I have never looked up the definition."

The word adenoid is not a pathologic term. It does not refer to enlargement, disorder or disease. Webster defines the word. It is an ana-

tomical term, a noun, a name applied to a natural structure. Adenoids are natural bodies, as natural as your eyes, or your teeth. What they are, where they are, what they do, the dangers of their removal, and their return, are interesting questions.

The word, adenoid, comes from the Greek words, aden, meaning a gland, and eidos, meaning like—like a gland. Adenology, the doctrine of the glands. Adenitis, inflammation of a gland. Adenotomy, a cutting or incision of a gland. Adenectomy, the complete removal of a gland. Tonsillotomy, the partial removal of a tonsil. Tonsillectomy, the complete removal of a tonsil. Tonsillectomy is synonymous with enucleation. The words adenotomy and tonsillotomy are sometimes used synonymously. So are the words adenectomy and tonsillectomy.

There are three sets of circulating channels in the human body, arteries, veins and lymphatics. Through the lymphatic vessels a fluid circulates which protects the system from the invasion of germs and other deleterious substances. This fluid, called lymph, contains a vast number of bodies, microscopic in size, called lymph cells, lymphocytes, leucocytes and phagocytes. These attack, digest and destroy germs and poisons which gain entrance to the lymphatic vessels. The direction of the lymphatic current is always from the surface toward the center of the body. Attached to the lymphatic vessels, especially those surrounding the orifices of the body, as in the back of the mouth and behind the nasal passages, there are bodies called adenoids. Different names

are given to these bodies. *The smallest in size are called lymph nodules, the medium, lymph nodes, and the largest, tonsils.* There are countless thousands of the smaller adenoids scattered about in and underneath the lining membranes of the mouth and the parts behind the nasal passages. *Adenoids cannot be seen by the naked eye, excepting the very largest size, called tonsils.* And as a rule only two tonsils can be seen; those placed on each side, at the back of the mouth, called faucial tonsils. *By means of a reflecting mirror placed in the back of the mouth, looking upward into the cavity above the hanging palate, behind the nasal passages, situated at the roof of the cavity, another tonsil, called the pharyngeal, may sometimes be seen.* When the pharyngeal tonsil swells, the untutored change its name and call it "adenoids." *A mischievous misnomer, highly improper, wonderfully confusing.*

In the back of the mouth and in the cavity behind the nasal passages, there is a peculiar, elaborate and important arrangement of adenoid bodies, known by the name of *Waldeyer's lymphatic ring*, which is composed of six tonsils—the pharyngeal, two faucial, lingual (located on the back of the tongue), two tubal (located at the mouths of the Eustachian tubes, in the cavity behind the nasal passages), with a secondary supporting formation consisting of numerous nodes and nodules. The bodies composing the ring are connected by lymphatic vessels, and communicate with one another. *Adenoids are so placed in the course of the lymphatic vessels, that the lymph in flowing toward the large central*

trunks, passes through them, undergoing a sort of filtration as it percolates through the partition walls of the lymph passages. Germs and other deleterious matter which in any way get into the lymphatic vessels are carried along until an adenoid is reached, and here they are deposited and destroyed by the lymph cells, while the lymph itself passes on. Adenoids are set like sentinels to guard the lymphatic channels against invasion.

Adenoids are filters. When engaged in the active process of filtration, they always swell. The swelling is in direct proportion to the protective requirement. There is no other cause for their enlargement than augmented function. The doctrine that they are filters is taught by *Delafield and Prudden (New York)*, *Adami and Nicholls (Montreal)*, and other leading authorities of to-day. In the process of filtration, when germs and other poisonous matters have entered the adenoid, *their presence in this body stimulates its activity and leads to a rapid increase in the number of lymph cells, lymphocytes, leucocytes, and phagocytes, the duty of which is to attack, neutralize or nullify the invading substance.* *Adenoids are readily excited by the mildest invasion.* Nature is ever alert to protect herself. A good illustration of the filter and protective action of adenoids is to be seen in the case of a cold in the head. When the lining of the nose is bathed in a secretion of mucus and pus, the faucial tonsils swell and are painful. The faucial tonsil acts as a filter, as a barrier, to the foul secretions of the nose. This statement has been made by *B. Fränkel (Berlin)*, and con-

firmed by *Von Levinstein*, *Von Lénárt* and other authorities. *Adenoids always swell when actively engaged in the process of filtration.*

"Adenoids," "adenoid vegetations," "pharyngeal adenoids," "epipharyngeal tonsil," are different names for the *pharyngeal tonsil*. *The pharyngeal tonsil* is attached to the roof of the post-nasal cavity, above the palate, and behind the nasal passages. It is the first lymphatic organ in the line of exposure to invading germs by way of the nose. As the most advanced outpost, or sentry-box full of lymph cells, which increase rapidly in their number upon the slightest alarm, it bears the brunt of every battle, when germs are attempting to invade the system by way of the nose. *It is the most important organ of Waldeyer's ring and is considered by Fränkel as the most important protective organ of the entire human organism.*

Westenhoeffer (Berlin), by the most exhaustive investigation, has proven conclusively that the germs of the cerebro-spinal meningitis find entrance to the general system through the nose and by way of the pharyngeal tonsil. The invasion of the system takes place, *Westenhoeffer states, only after the protective influence of the tonsil has been broken down by great number and virulence of the invading germs.* *In the exercise of its protective function, the organ always swells, and sometimes attains a very large size.* *Its enlargement is always in direct proportion to the protective requirement.* *There is no other reason for its enlargement than augmented function.* *The protective action of the adenoids*

is advocated by Goerke and Brieger, (Breslau), Metchnikoff (Paris), and by all the most distinguished living authorities.

A very clear demonstration of the filter action of adenoids is observed in the case of nasal catarrh, acute or chronic, in which the lining of the nose is swollen, and covered with irritating mucus, and in which also the faucial tonsils in the back of the mouth become swollen and painful. In almost every instance of abrasion of the nasal lining, these same adenoids become swollen, tender and painful. Thorough cleansing of the nose will cause prompt subsidence of the tonsillar swelling and pain. This direct filtration and protective action of the faucial tonsils, in case of the abrasion of the nasal lining, is taught by so great an authority as Fränkel of Berlin, and is endorsed by Von Levinstein, Von Lénárt and others. The protective action of adenoids is also advocated by Brieger, Goerke and Haymann of Breslau, Metchnikoff of Paris, Delafield and Prudden of New York, Adami of Montreal, and others.

Popular medical writers advocate the complete removal of "adenoids" as the only appropriate remedy for all the symptoms which they allege "adenoids" occasion. *They say "adenoids cause" and "The operation cures, frog face, bow legs, pigeon breast, club feet, irregular jaw, twisted teeth, short thick upper lip, narrow nostrils, open mouth, expressionless and undeveloped face, misshaped nose, nasal catarrh, impaired smell, laryngitis, spasm of the larynx, false croup, cough, hoarseness, defective speech, stammering*

and stuttering, inflammation of the eyes, defective eyesight, misshaped ear drums, inflammation of the ears, plugged Eustachian tubes, mastoid disease, deafness, impaired taste, bad breath, disordered stomach and bowels, constipation, biliousness, weak bladder, incontinence of urine, bad dreams, snoring, grinding of the teeth, disturbed sleep, daytime restlessness, depression of spirits, lack of energy, stupidity, headache, listlessness, backwardness in study, retarded and impaired mental faculties, stunted growth of body, paroxysmal sneezing, hay fever, asthma, bronchial affections, lung diseases, nervous diseases, epilepsy, St. Vitus' dance, wry neck," etc. Each and all of the symptoms above mentioned are quoted from standard text-books.

This remarkable indictment of *a swollen pharyngeal tonsil*, the so-called "adenoids," is apt to stagger good judgment, and *constantly demands the greatest skill in determining the precise conditions that exist* in each and every instance. The full measure of value possessed by the art of diagnosis, by that art the knowledge of which leads to the determination of a disease by means of distinctive marks or signs, is always demanded wherever "adenoids" are suspected. *The art of diagnosis is difficult.* Experts in the art are few. The art exacts a profound knowledge of diseased conditions, and of their relationship to one another. To become an expert diagnostician requires great experience.

A correct diagnosis will clear the field of most of the terrors that surround cases of supposed "adenoids." A positive opinion can not be safely

based on "suspicious" circumstances. "*Adenoids*" may exist without causing any symptoms. Symptoms may be present without "*adenoids*." "The open mouth, frog face, stupidity, backwardness and slow mental and physical development" are not always due to an enlarged pharyngeal tonsil. Far from it. *Ninety-five per cent of the so-called "adenoids," judged by the open mouth alone, are mistakes in diagnosis.* Neither does the pharyngeal tonsil, when enlarged, the so-called "*adenoids*," appear as a soft jelly-like mass, bathed in a blanket of mucous secretion; but, upon the contrary, it is as firm and as hard as an enlarged faucial tonsil.

Friedrich (*Rhinology, Laryngology and Otology in General Medicine*):

"Any and all diseases of the nose and post-nasal space which are followed by obstruction of the nasal passages lead to passive hyperaemia in the mucous membranes, which in turn produces occlusion of the Eustachian canal. The recognition of this important fact is comparatively recent."

"The interference with nasal breathing may be due to a number of conditions within the nose, as hypertrophy of the mucous membrane, mucous polypi, tumors, foreign bodies, etc."

"If I have included *hypertrophy of the pharyngeal tonsil or adenoid vegetations* among the diseases which produce hyperaemia and swelling of the mucous membrane with occlusion of the tube, by interfering with nasal respiration, it is because I believe the occlusion is due to a general '*adenoid habit*' of the nose and pharynx, rather

than to the direct mechanical intrusion of the pharyngeal tonsil."

"Two forms of adenoid enlargement are distinguished: a diffuse, cushion-like hyperplasia, and a villous variety consisting of the finger-like projections or true vegetations."

"As the vegetations usually spring from the median line, they are not, when at rest, in contact with the lateral walls of the pharynx, and therefore do not occlude the orifices, as we are frequently able to demonstrate in the post-rhinoscopic image."

"The adenoid tissue is not the soft, gelatinous mass that it is sometimes compared to, but is comparatively firm, and returns to its normal position of rest, dependent on gravity, as soon as the constriction of the pharynx and the tensores and levatores palati relax and the post-nasal cavity regains its normal volume. But it is not clear to me how a momentary occlusion of the orifice can have the same effect as a permanent one, and I therefore consider the hyperaemia of the entire mucous membrane the most important factor in the production of aural complications."

"Paralysis of the muscles of the soft palate, especially of the levator veli palatini and tensor veli palatini—muscles which effect the opening of the Eustachian tube—is followed by permanent occlusion with the usual appearances of the membrana tympani. The action of the muscles may be similarly affected by tumors, tubercular ulcerations, or their scars, and by cleft palate, so that these conditions are also occasionally accompanied by middle-ear disease."

There are two ways by which to prove the presence of "adenoids." They must be seen. They must be felt. They may be seen by reflection in a mirror, placed in the back of the mouth, looking upward into the cavity behind the hanging palate. They can sometimes be seen by looking through the nostrils. They can be felt by the finger introduced into the mouth and pushed up behind the hanging palate. *Sight and touch alone can determine the presence of "adenoids."* Is it easy to see "adenoids" in the glass or through the nostrils? No. *It is most often impossible.* Is it easy to introduce the finger behind the hanging palate? *Not always. Sometimes it is impossible.* And it is always unwise to try to introduce a large finger. The precise facial expression of "adenoids" may be simulated by any nasal obstruction. There may be very great enlargement of the pharyngeal tonsil without the typical facial expression. Natier insists that in some neurotic children a state of "false adenoidism" exists. *W. Braden Kyle (Philadelphia, 1907),* remarks: "The symptoms of adenoid vegetations are very much the same as those found in any nasal or post-nasal obstruction. I have seen many cases of post-nasal obstruction in children which on examination would seem to indicate immediate surgical interference, in which complete relief was obtained by the correction of intestinal irregularities, such as obstruction, constipation, or irritation produced by intestinal worms, there will result turgescence with watery infiltration of the nasal and post-nasal structures. The pharyngeal tonsil in childhood is a normal structure, and its

enlargement as described above is frequently mistaken, for an increase in cellular elements when in reality it is only the normal structure enlarged by fluid distention."

Lennox Browne (London) states: "The post-nasal space may be blocked by polypi, cysts, and hypertrophied turbinals or by fibrous and malignant tumors. But by far the most common affection is enlargement of the pharyngeal tonsil called 'adenoids,' 'growths' or 'post-nasal vegetations.' The 'vegetations' are not new growths but merely outgrowths of the normal tissue of the region."

Sir Felix Semon (London, 1902) says: "Lymphoid tissue being very vascular easily becomes the seat of catarrhal inflammation, when it swells considerably, and pro tem, may present all the symptoms of 'adenoids.' I am a great skeptic with regard to reflex neuroses arising from the upper air passages in general, and particularly so, with regard to those said to be due to 'adenoids.' Let me warn you against too hastily diagnosing 'adenoids' from facial appearance and nasal obstruction alone."

Marage (Paris): "Divides patients suffering from adenoid tumors into three classes: (1st) Those who have hard and large tumors; they present generally very serious complications either affecting respiration and its development, or by affecting the hearing. (2nd) In the second class we arrange the patients in whom the growths are soft, large and bleed readily under the pressure of the finger; there is a cessation of development of the patient, a deafness more or

less persistent, an inaptitude for work. (3rd) The third class comprises those who with the *growths but little developed* present in general only the following symptoms, intermittent deafness, mouth partly open, snoring at night. Hospital patients are almost all comprised in the first category."

"Adenoids" is not a fatal disease. Not one death from this cause has ever been reported. *But thousands of deaths have occurred from the operation for their removal. The operation is always bloody, always painful, always dangerous.*

The most eminent operators in the world have reported deaths from operations, the list including such skilful technicians as *Lennox Browne, Mayo-Collier, Schmiegelow, Damianos and Hermann, Sandfort, Marage, Escat, Delavan, Burger, Schuchardt, Stucky, Sachs, Preble, Putnam, Barkan, Hooper, Bliss, Kenefick, Stewart, Newcomb, Thompson, Goldsmith and others.*

When these most experienced and skilful operators report deaths, then what of those with lesser experience and lesser skill?

The operation for the removal of "adenoids" *is followed by the most appalling list of accidents of any operation in the history of surgery.*

Serious accidents have been reported by such distinguished operators as, *Grönbeck, Tilley, Castex, Coley, Browne, Wingrave, Riviere, Hagedorn, Broeckhaert, Holmes, Lunin, Hermann, Mygind, Thurly, Quinlan, Hope, Citcelli, Hennebert, Chappell, Weber, Woblews, Bulso,*

Urban, Cline, Kan, Thomas, Ryan, Wilkinson, Nettlebrock, Avale, Henking, Henkes, Cunningham, Chapman and others.

Among the accidents reported as following the operation are: "Death from hemorrhage, immediate or secondary; recurrent hemorrhage; asphyxia, mental disturbance; laceration of lining membrane of post-nasal cavity; injury of the nasal septum; recurrent nasal hemorrhages; permanent derangement of blood circulation in the nose; permanent redness of the nose; injury and laceration of the palate, palatine muscles and of the uvula; paralysis of the velum of the palate; injury of the Eustachian tubes; acute inflammation of the post-nasal region; inflammation of the nasal lining membrane; infection of the wound; abscess; diphtheria of the wound; blood poisoning; scarlet rash; cerebral meningitis; arthritis; tonsillitis; laryngitis; inflammation of Eustachian tubes; ear disease; mastoid disease; rupture of ear drums; running ears; ear-ache; deafness; inflammation of the eyes; disturbance of vision; alteration and impairment of the voice; removal of the first important line of defense against germ infection; awakening of latent diseases; development of sarcoma (cancer); development of latent tuberculosis in adjacent glands and in the lungs; neuralgia; headache; vertigo; syncope (faintness); general nervousness; spasm of the larynx; asthma; goitre; Basedow's disease; profound anaemia, loss of general health and strength; troublesome contraction of wound; troublesome scars, return of 'adenoids,' " etc.

It is impossible to completely remove adenoid tissues. This statement is made by *Grober of Vienna, Von Levinstein of Berlin, Goerke and Brieger of Breslau, Marage of Paris*, and others.

Adenoids grow again after they have been removed. This is the teaching of *Goerke, Von Levinstein* and others. The same causes which led to the first growth lead to a new growth.

Adenoids disappear spontaneously. This statement is made by *Escat (Toulouse), Bosworth (New York), Grayson (Philadelphia)* and all other authorities. "Adenoids," or to speak properly, *enlargement of the pharyngeal tonsil*, is not so common as the doctors say, or as the public imagines. From reports courteously sent to me by *S. Josephine Baker, M.D.*, of the *Department of Health, New York City*; the *Report of the Department of Health of Chicago*; *Oliver P. Coonan*, the *Board of Public Education of Philadelphia*; *George P. Barth, M.D.*, *Public Schools Medical Inspection, Milwaukee*; the *Superintendent of Instruction of Public Schools, St. Louis*; *H. B. Burns, M.D.*, *Department of Public Health, Pittsburgh*; *Chas. H. Keene, M.D.*, *Department of Public Schools of Minneapolis*; the *Annual Report of the Department of Public Health, San Francisco*, I have made the following collaboration of the whole number of pupils examined, of the number that had enlarged adenoids, and of the number that had enlarged tonsils.

	Number Examined	Number with enlarged adenoids	Number with enlarged tonsils
New York City, 1910....	266,426	40,946	50,012
Chicago, 1910	126,847	4,702	24,286
Philadelphia, 1911	25,000	852	714
Milwaukee, 1910-1911 ..	19,616	506	3,834
St. Louis, 1910-1911	16,788	204	952
Pittsburgh, 1911	12,704	1,324	2,322
Minneapolis, 1911.....	7,102	2,042	2,474
San Francisco, 1909-1910	2,207	173	409
	476,690	50,049	85,003

The table shows that *less than one in nine of the whole number examined had enlarged adenoids. Less than one in five had enlarged tonsils.*

In the Eleventh Annual Report of the City Superintendent, New York City, 1909, there is an article on "*The Relation of Physical Defects to School Progress*," by Leonard P. Ayres, in which it is stated that "a careful tabulation was made of the records of physical examinations of 7,698 children who had been examined by school physicians. *Nearly 80 per cent of the children who were of normal age for their grades were found to have physical defects, while only about 75 per cent of the retarded children were defective. The percentage of defective children in the lower grades was decidedly greater than in the upper grades.* Retarded children will be older than their fellow pupils in the same grade. In all cases it will always be true that the backward pupils will be the older pupils. Now, the older pupils are found to have fewer defects. This is true whether they are behind their grades or well up

in their studies. Eighty per cent of all children of normal age have physical defects more or less serious, while 75 per cent of the retarded children are found to be defective. About one child in every four has hypertrophied (enlarged) tonsils. About one child in eight has adenoids. The figures do not really show the retarding influence of each sort of defect separately for the reason that the same child is often suffering from several sorts of defects."

In a pamphlet on "*What American Cities are Doing for the Health of School Children*" published by the *Russell Sage Foundation of New York*, covering a report of 1038 cities, it is stated that "medical inspection of the public schools is for the purpose and to best enable the child to take full advantage of the free education offered by the state. *Let us have good men to do the work and let us pay them well. It will demand a special training and a careful technique. It is certainly to be regretted that this point of view has not been more generally taken in America.*"

The fact is notorious that the medical inspection of the public schools, as a rule, is made by the very youngest and least experienced physicians. *Politics and inexperienced physicians will endanger the entire system of inspection.*

The Russell Sage Foundation Report states that "There are 75 cities in which doctors donate their services. The average salary paid to doctors falls within from \$200 to \$300 per annum. Two hundred dollars per annum has come to be regarded as a somewhat standard rate of remuneration for school physicians all over the United

States." The following table gives a partial list of cities taken from the Report of population and the number of doctors employed by each city.

	Population	Doctors Employed
New York City	4,763,883	142
Chicago	2,185,283	100
Philadelphia	1,549,008	30
St. Louis	687,029	6
Pittsburgh	533,905	30
San Francisco	416,912	1
Milwaukee	373,857	10
Minneapolis	301,408	7

In the City of Pittsburgh, the school doctors receive one hundred dollars per month. And there are just as many school doctors in this City as in Philadelphia, which has three times the population of Pittsburgh. The question becomes pertinent, Does Pittsburgh receive three times more efficient service than Philadelphia? And at five times more cost than the average inspection throughout the United States? Does Pittsburgh receive more than thirty times the efficiency of San Francisco? By what gauge may the marked discrepancies be explained and may efficiency be best judged, or, is the whole situation at present really one of politics and graft?

Inspection and inquisition are sometimes coupled in the Pittsburgh schools. What doctor attends your children? is sometimes asked of the parents. Sometimes parents are told to take their children to certain doctors whom the in-

spector designates for operation. And sometimes particular hospitals are favored.

In a paper read before the *Society of Medical Inspectors of the City of New York*, December 4, 1908, *Dr. Neustaedter* stated:

"Much stress has been laid upon such physical defects as enlarged tonsils, adenoids, refractive errors, and carious teeth, as the most prominent causative factors in backward children. But when we survey the statistics and find 85 per cent of all school children are suffering from some physical ailment, and among the sufferers 95 per cent are bright pupils, and on the other hand some of the most vicious children whom I have personally examined presented no physical defects that I was able to detect, it seems to me *imperative that we look further than tonsils and adenoids.*" He mentions drug habits, bad food, impure air. Under date of April 25, 1911, he continues: "Among 8,000 pupils, 10 per cent of all are the very best, and about 10 per cent are backward. *Tonsils are slightly more prevalent in the best pupils. The best singers have 50 per cent more tonsils than the poorest. I have yet to see the backward pupil who became proficient after removal of tonsils, provided other factors were not ameliorated. Six hundred backward pupils who had their diet and mode of life changed, and of whom only two per cent had corrected physical defects gave good results, namely: 93 per cent did good work after six months.*"

William L. Bodine, president of the *National League of Compulsory Education*, in his annual

address to that body, said: "The underfed child means the backward pupil at school, and the backward pupil means truancy, or delinquency. Poverty is the great cause of truancy and irregular attendance. The higher the cost of living the lower the chances of the children of the poor to complete the eighth grade."

Being under-fed is a good reason for a pupil being backward. No one should expect a hungry child to make a bright pupil. But, at the same time that a charitable public furnishes milk and sandwiches to under-fed children upon their arrival at school in the morning, it is not consistent for the school doctor, when he arrives, to take out their tonsils and "adenoids" upon the ground that they are backward pupils.

Remarkable improvement has been noted in mentally and physically backward children following the administration of thyroid extract.

The operation for "adenoids" should never be undertaken without serious consideration. It is often very difficult. It is always bloody; always painful and often fatal. The operation should never be performed in cases that cause no symptoms; never in patients who are known as bleeders. The results of operation will always be disappointing in cases that accompany nasal catarrh; with thickening of the lining of the nasal passages; in cases of narrow nostrils, and misshaped nose; in cases of irregular teeth; in deformity of the upper jaw; in deformity of the mouth and palate; in cases of deafness, with inflammation of the middle ear and with thickening and hardening of the linings of the ear passages;

in affections of the ear drum; and in all children with poor constitutions, improper or insufficient food, and bad hygienic surroundings.

Normal adenoid tissues should always be preserved if possible. In the strictest concordance with the very latest teachings of the very latest and best authorities, namely: (1) of *Delafield, Prudden, Adami* and others that adenoid bodies of all sizes, whether called nodules, nodes or tonsils, are filters; (2) of *Brieger, Goerke, Fränkel, Metchnikoff*, and others that they protect the human system against the invasion of germs; (3) of *Grober, Escat, Goerke, Mackenzie, Von Levinstein* and others that they cannot be completely removed by a surgical operation; (4) of *Goerke, Brieger, Von Levinstein, Escat, Wright, Grayson* and others that when removed they grow again; (5) of *Escat, Bosworth* and others that they disappear spontaneously; (6) of *Mackenzie, Semon* and others, that the operation for their removal is greatly abused by its ignorant and reckless mis-application to unsuitable cases; (7) of the fact that the operation is followed by numerous deaths; (8) of the fact that the operation is always bloody, always painful, and is followed by the most appalling list of accidents that ever followed any surgical measure; (9) of the fact that 92 per cent of all cases can be cured without operation, as proved by *Marage* and others, I desire to ask, *Is it not reasonable to demand that greater restrictions be imposed upon operations for the removal of "adenoids"; that greater efforts be made to improve the hygienic, physiologic and*

sanitary conditions of the patient; to better the ventilation of the sleeping apartments; to better the quality and quantity of food and to regulate outdoor exercise; to thoroughly cleanse and keep sterilized the nasal passages; and to adopt the newer lines of treatment, safer and more in accord with the modern research of Lénárt and Poli and the therapy of Von Levinstein, Fränkel, Brieger, Goerke, Chiari, Marage, Escat, Moure, Jacobi and other high authorities?

CHAPTER VII

THE TONSILS AND THE TEETH.

The functional relationship between the teeth and tonsils is interesting. *George H. Wright*, in an elaborate article in the *Boston Medical and Surgical Journal*, May 20, 1909, gives a detailed account of his views regarding this relationship, and draws "attention to four periods in the development of an individual from two to eighteen years, when the tonsils become slightly enlarged without inflammation and without obstruction or evidence of suppuration, and these four periods are represented practically at the time when four groups of molars are in the process of eruption. That is, the periods with slight variation are from two years for the first group; six years of age, the second group; twelve years, the third group; and from seventeen, the fourth group.

"I propose to show that these enlargements of tonsils coincide definitely with these particular periods of tooth eruption. I hope to show, too, that when there is no infection of the tonsil, by keeping the patient under observation and giving, if necessary, simple prophylactic treatment to the tonsil and waiting for the normal eruption of the tooth, even the slight hyperaemia of the tonsil, which is its expression of function, will entirely disappear and the tonsil will return to its normal condition.

"We offer for consideration nineteen patients, and in each case the enlargement coincided with

the second, third or fourth periods of tooth eruption. In no instance did we find excessive enlargement or suppuration. Yet all these patients were sent to us by physicians and social service workers, or they came on their own initiative for treatment and operation. None have been operated on for removal of the tonsils. In two patients under observation since last May, the tonsils have returned to normal and the teeth are fully erupted.

"Another aspect of the problem is illustrated by a boy, age eleven, who had his tonsils extirpated three years ago; he came to us for treatment for glandular enlargements in the neck. The tonsillar gland is markedly enlarged and other glands enlarged and distributed down to the border of the clavicle. No history of tuberculosis in family."

"We exhibited another patient, girl, age seventeen. Tonsil slightly enlarged on right. Left tonsil normal. Right tonsil later removed. Three months later patient returned and shows enlarged tonsillar gland the size of a hen's egg. Examination of mouth reveals lower third molar cutting through the gums—the fourth period. Also remnant of root of lower six year molar. The root was extracted and operation on glands deferred. One month later patient reported. We found the gland reduced to normal, no pain or swelling of any kind and tooth erupted. (Since reporting these cases, January 30, 1909, we now have a record of forty-nine patients where operations on tonsils have been deferred,

awaiting eruption of the molars in the several periods.)

"With the enormous structural upbuilding where nature is elaborating the materials for forty-eight teeth, and the jaws, there is much waste tissue to be disposed of. Sometimes there will be a swelling in the region of the submaxillary and lymphoid enlargements, intense pain, excessive salivation, followed by a hot and feverish condition of the oral mucous membrane, and occasionally a slight cough. The disturbance may continue until we find a slightly enlarged tonsil, or even acute otitis media with a sinus and profuse suppuration discharge through the external ear. Usually within a few hours or days, at least, the offending molar will make its appearance through the gum, disturbance will cease, and tonsil return to its normal condition. So, too, in the adjacent region of the upper first and second temporary molars, we may find lymphatic enlargements involving the parotid gland, lachrymal gland and tonsil. The faucial tonsil and normal adenoid upon the side nearest to the erupting tooth may become considerably enlarged through the influence of the lymphatically absorbed waste.

"Some years ago we made experiments by sealing a coloring of Prussian blue into teeth pulps of dogs, to determine the lymphatic drainage, and it was shown conclusively that the blue particles passed directly through the pulp to the lymphatic glands and endothelial spaces.

"Wood states: 'Clinically the gland which becomes enlarged during tonsillar infection appears

to be superficial and has led to the belief that the posterior gland of the submaxillary groups is infected through the tonsils.' This may be rightly so under some conditions, yet I incline to the belief that this particular gland which may become enlarged at the periodic time of teeth eruption and coincident enlargement of the tonsil is enlarged not because of infection through the tonsil *per se*, but through normal waste or combined with bacteria from the diseased membranes adjacent to erupting teeth, and that the enlargement of the gland is due to this latter process, and the tonsillar enlargement without infection is a normal expression of the active function of the tonsillar gland, and when the tonsil becomes infected, it does so because of its lack of power of resistance to the invasion of micro-organisms.

"*Jonathan Wright* has made a careful study of normal tonsils in relation to behavior of the epithelial cell in the crypts toward bacteria and their relation toward dust, with conclusions which demonstrate that pathogenic bacteria inhabit the tonsillar crypts in great numbers, and do not enter the tonsillar tissue proper so long as the tonsils are in a normal and healthy condition."

The author of the latest text-book on the "Diseases of the Nose, Throat and Ear," has "attempted the complete removal" of 2,000 tonsils! What per cent. were examined in connection with carious teeth? What per cent. came in the four periods of tooth development? What per cent. would have been unnecessary when function of tooth eruption had ceased? What per cent. were slightly enlarged with no mechanical obstruction

or abscess? What per cent. might have responded to prophylactic treatment and given no subsequent trouble? What per cent. have or will develop deeper troubles beyond these barriers of the lymphoid ring of *Waldeyer* because it is presumable that the adenoid tissue was removed at the same time from the vault of the pharynx? What per cent. of cases of temporary paresis of the palato-pharyngeus muscles, cervical cellulitis and hemorrhages? What per cent. of lymphoid enlargements, both superficial and deep, will occur later in life?

George H. Wright: "As to what the tonsil may yield as a by-product after the metamorphoses of this normal waste, and what influence the by-product as a secretion through the crypts to the digestive canal may have upon the body as a whole, is a question for the future to determine.

"In conclusion, we offer these six observations:

(1) When a tonsil is normal, infection from the external surface is rare.

(2) Secondary infection through the lymph channels is the usual source.

(3) There are four periods of molar eruptions, with some variations in time when the tonsils may enlarge without infection or inflammation, at two years, six, twelve and seventeen.

(4) Tonsils, when slightly enlarged and not infected, return to normal with complete eruption of the teeth.

(5) Diseased teeth are a prolific source of enlargement of the glands, through proximity of membranes, either directly, by infection, or by toxins.

(6) In the treatment of the tonsil by the specialist, may we not include as a routine the observation as to carious teeth and a recognition of these four periods of eruption coincident with slight enlargement?"

C. F. Cobb: "For years no one has understood the importance of the tonsil, and, being considered useless, it has been removed freely.

"The tonsil lies between the pillars attached to the fascia of the superior pharyngeal muscle protected in front and rear by the pillars to one-half or more of its extent. From the pillars anterior and posterior a reflexion of mucous membrane comes to the tonsil, making it, when at rest, resemble a telescope one-half closed. Were it not for this reflexion of mucous membrane, the contraction and expansion of the organ would be checked by the mucous membrane about it and great pain would result on any enlargement of the gland. *This arrangement seems to show that nature intended the tonsil to be free to change its shape in accordance with alterations in size due to some functional activity. And this agrees with clinical facts, for we find tonsils now large, now small, at one time recommended for operation, and a few weeks later, when the date arrives, of such reasonable proportions that no operation seemed wise.*

"Of late years, theories of absorption from tonsils have come in and tonsils have been condemned on slight evidence and removed.

"Let us take two hypotheses: First, that the tonsil is an organ for infection or absorption; second, that it is a protective organ. First then,

acute tonsillitis affects the tonsil and gives rise to toxic symptoms. Tuberculosis enters by the tonsil at times and tubercle bacilli have been found in the follicles of the tonsil. Rheumatism is said to be a result of tonsillar absorption.

"Of course, it is claimed by many advocates of this theory that the tonsils causing such troubles are diseased tonsils, but practically, as disease can only be determined in most cases by removal of the tonsils and examination under the microscope, the result has been the removal of healthy tonsils, the working theory being that the tonsil might form the source of infection; and in any case no harm could be done.

"Now let us discuss the probabilities, as seen from an anatomical and pathological standpoint, of the question whether the tonsil is an absorptive or protective organ.

"If the tonsil were intended to absorb poisonous substances, why should nature give them to young and tender children and allow them to atrophy as the person grows older?

"Why should nature surround the tonsil with chains of lymphatic glands which resist infection into the general system?

"How is it that millions of staphylococci, the poison of which to a mild extent reaches the general system, causing a fever for a day or two, can be cared for by this maligned organ, when a very, very few, in a wound, may result fatally?

"But it will be said, Does not tuberculosis sometimes get in in this way?

"It is true, probably, that it does, but it is also true that because a sentinel is sometimes over-

powered by an enemy a wise commander does not abolish all sentinels. There are other channels for tuberculosis. We find them in Peyer's patches in the intestine and in the glands which drain the bronchi of the lung. Who suggests the wisdom of destroying such organs because they have failed in their efforts to protect us?

"Now, Dr. Wright tells us that the tonsil serves as a sentinel for the protection of the system from the products of dental infection, and this idea is borne out by common sense, by clinical experience and by theory.

"I have myself watched the improvement in size of tonsils after the removal of bad, rotting teeth. This function is, perhaps, one and not the only function, but it is enough to justify the tonsil's presence; and our gratitude is due to him for clearing up this point. Do not misunderstand these remarks. Removal of obstructing tonsils when breathing, swallowing, or disease is present, is justifiable and wise, but radical extirpation should only be done where disease of the tonsils, chronic tonsillitis or peritonsilar abscess make it necessary, and this rule is especially true in early youth." (*Boston Medical and Surgical Journal*, May 20, 1909.)

A. Coolidge, Jr.: "A considerable variation in the size of the pharyngeal or faucial tonsil must be looked upon as within normal limits. The lymphoid tissue may become increased in amount to an extent to be considered pathological, either as a whole or in one or more of the tonsillar masses. This increase over the normal amount takes place almost exclusively in chil-

dren, although once established, it may persist into later life. It is of especial importance in the naso-pharyngeal space, where it is commonly called 'adenoids' and in the faucial tonsils, when the patient is said to have enlarged or hypertrophied tonsils.

"Among the causes to which we must look for tonsillar enlargement, Dr. Wright now adds certain conditions of the teeth." (*Boston Medical and Surgical Journal*, May 20, 1909.)

G. Hudson-Makuen: "The Faucial Tonsils and the Teeth," June, 1909: "Diseased faucial tonsils affect the teeth in three ways. First, they interfere with the general health of the patient and thus with the proper nourishment of the teeth. Second, they contribute very largely to the local invasion of the teeth by the numerous bacteria which emanate from their crypts. And third, they interfere by pressure with the alignment of the teeth and with the normal development of the maxillary bones.

"We cannot cure mouth-breathing and its resultant disastrous effects, in all cases, merely by the removal of tonsils and adenoids. When there are dental irregularities which make it impossible, difficult or even a little inconvenient to close the mouth, something more than tonsillectomy and adenoidectomy must be done."

After removal of the wisdom teeth the back part of the roof of the mouth will sometimes sink or drop down to the extent of fully a quarter of an inch. The removal of tonsils, also, according to *Von Chiari*, will cause the roof to fall down in

a similar manner—the tonsils act as a prop or support to the back part of the roof of the mouth.

A high, narrow palatal arch is often associated with a deflected septum and irregular teeth. *Sturmann (Berliner Klinische Wochenschrift, June, 1912)* employed a brace for two and a half months and made the palate and septum practically normal.

William S. Flower, an able, experienced and conscientious dentist, has suggested that “in new-born babes it is a good practice to make a habit of pressing the thumb firmly against the roof of the mouth; that this practice spreads the upper jaw, and widens the roof, preventing a saddle-back formation of the jaw; and later facilitates the ease in eruption of the molar teeth and helps to prevent the development of irregularities; by widening the jaw it causes the roof to fall to an extent, creating thereby a more roomy, better drained and better ventilated post nares.” *Flower* states that “the tonsils are more often affected from disease of the gums about the necks than the roots of the teeth.”

The habit of the Indians in tying up the mouth of their new-born babes, so as to force them to breathe through the nose, is an excellent practice, and may help to account for the fine nasal respiration and the absence of “adenoids” in this race.

Recently, a young lady applied to me, with the statement that: “I have a severe pain in the left side of my face, so severe that I have had no sleep for fourteen days and nights. My physician says that I have disease in the antrum and

that I must be operated upon, and has directed me to see a specialist on the nose."

I examined her carefully, found no disease in the antrum, but that her teeth were causing the pain. She said, "I have seen my dentist and he has assured me that my teeth are all right and that they have nothing to do with the pain, but that the antrum is diseased."

I answered that if she had no objection, we would consult my dentist. We did so, and he discovered that the pain in her face was caused by a tooth that was pressing hard against its neighbor. Pressure was at once removed and the pain of fourteen days ceased instantly.

A gentleman applied to me, saying: "I have been to a specialist who has told me that the bones in my right cheek are dead, and that I must go to the hospital and have them removed to relieve the severe pain in my right cheek." After careful examination, I said to him: "The bones in your right antrum are not at all diseased, but your trouble comes from your eye tooth." We consulted *Flower*, who confirmed my diagnosis, and by attending to the tooth, the trouble in the face quickly disappeared.

In another case a young lady suffered from severe pain in her ear. She was told by a specialist that she had mastoid disease, and that the mastoid operation was imperative at once to relieve the pain. The mastoid operation was performed, but the pain did not abate. In several days after the operation, she cut a wisdom tooth and the pain disappeared immediately.

CHAPTER VIII

SIX MEDICAL QUESTIONS.

Question Number One.

Have the normal faucial tonsils any function: physiologic, biologic, chemical, phonetic or other?

By *normal* faucial tonsils, I mean the tonsils situated in the fauces, between the anterior and posterior palatine arches, in healthy condition, and of such size as not to project beyond the line of the palatine arches, nor press upon surrounding tissues, of a size so small as not to interfere with the perfect anatomical outlines of the walls of the pharynx.

Answers:

H. Holbrook Curtis: "In my opinion—no."

Eugene H. Hodenpyl: "The function of the tonsil is unknown."

G. Hudson-Makuen: "The question in my mind is still *sub judice*."

A. Coolidge, Jr.: "I do not believe that any one knows. The fact that they are there should be presumptive evidence that they have."

Edwin Pynchon: "If the tonsils have any function at all, it must be only in babyhood or the early years of life, as Nature's apparent effort is to diminish them in size—so-called atrophy. I claim this atrophy is more apparent than real, being largely a transition from protrusion to submersion. In the change the lymphoid element is

absorbed or destroyed and the glandular element relatively increased. The disadvantageous feature of it is that this change is produced by and through a low grade of inflammatory action, resulting in an increase of tonsillar secretion of bad character which increases troubles in both the pulmonary and gastro-intestinal tracts. While when submerged it may be claimed that they do not interfere with the outline of the walls of the pharynx, they at any rate fill a space which should be concave like an inverted trough. Inwardly they may also exert pressure as on the Eustachian tube, etc."

A. Barth: "About the importance and function of the faucial tonsils I have my ideas formed from the literature and our own observations. But I think that in a collective research, to have scientific value, only personal researches should be considered. These are not considered in this question."

George B. Wood: "I cannot accept your definition of what is a normal faucial tonsil, as I believe that large tonsils may be a personal idiosyncracy and not the result of disease, just as in the nose—sometimes big and sometimes small. As to their function they undoubtedly form lymphocytes in the germinating follicles, and, according to my belief, also form a metamorphosis of the epithelial cells of the crypts. Further than this they have not been proven to have any function."

J. MacIntyre: "With regard to the first two questions, I really cannot pretend to say more than is recorded in our text-books."

J. E. Newcomb: "Have made no special studies in this direction."

E. M. Holmes: "I have made no original research, and therefore my opinion is without weight."

E. W. Scripture: "No phonetic use known. Enlarged tonsils change the timbre of the voice."

C. H. Knight: "I presume they have."

Sir Felix Semon: "In reply to your inquiry, I beg to say that I do not know enough of the physiological role of the faucial tonsils to give an apodictic opinion in a few lines. In my lectures, '*Some Thoughts on the Principles of Treatment in Diseases of the Upper-Air Passages*' (*British Medical Journal*, November 2 and 9, 1901), I have energetically protested against operative intemperance in my specialty and need not say that I should consider removal of *normal* tonsils an absolutely inadmissible proceeding, which could not be condemned severely enough. In Volume XIII of the *Reports of St. Thomas's Hospital (London)*, you will find under the heading, '*The Throat Department of St. Thomas's Hospital in 1883*', quite a lengthy article from me on '*The Indications for, and Methods of, Removal of the Tonsils*', which will give you full particulars on several of the questions concerning which you wish my opinion. What seems to me most important is: to keep the happy medium between operative intemperance and the happy-go-lucky operative inactivity."

Lubet-Barbon: "I do not know the function of normal tonsils."

Luc: "No personal experience nor views on the subject."

Beverly Robinson: "I believe so."

John N. Mackenzie: "I can add nothing definite to our imperfect knowledge of the subject. I believe that the tonsils were put into the throat of man with good, and not evil, intents to serve a physiological rather than a pathological purpose and that if they were originally intended as easy and natural avenues of infection, then nature made a poorer job of it than she did in the case of other portals of germ entrance, such, for example, as the respiratory passages."

St. Clair Thomson: "I think they must serve some function in quite early life."

Wesley Mills: "I believe they have, though I do not feel justified in teaching that to my students. I think their function is so slight that they can in their work be readily compensated for by other organs. I am inclined to think that they are related to the glandular system in some way."

E. B. Gleason: "I believe they have other functions beside those in common with other portions of the lymphatic system."

George L. Ross: "Undoubtedly. Especially physiological and chemical, but I have never followed this question in the physiological laboratory and therefore am not prepared to furnish facts."

George B. Rice: "Yes."

J. W. Gleitsmann: "The normal faucial tonsil has in my opinion a physiological function."

William E. Casselberry: "Yes; to the best of my knowledge and belief."

Frank E. Miller: "Lubricates principally. Remove tonsil with capsules and atrophic pharyngitis ensues, also adhesion of pillars. Regulators of pillar action and secretions. They are indices of intestinal changes, hence assist chemistry of the stomach and intestines principally on account of response to alkaline applications. As lubrication and regulation of phonetic muscles are involved in the working of a normal tonsil to such an extent is voice impaired. A healthy tonsil in some throats is never seen, except by means of pulling out of the way the anterior palatine wall, otherwise the arrangement of the parts are abnormal."

Von Chiari: "Most probably the tonsils serve for the purpose of formation of leucocytes."

Massei: "I believe the tonsils (the faucial normal) have a biologic function similar to the lymphatic tissue which forms the so-called *Waldeyer ring*."

Escat: "I am of the opinion that the faucial tonsils have not for their only function that of phagocytosis studied by *Metchnikoff*, but also a *physiological and biological function, due to an internal secretion*, like all the secretory internal glands (thymus, thyroid, liver, etc.)."

Moure: "I consider that the normal tonsils have physiologic, biologic, chemical and phonetic functions. There is no doubt that they are the advanced sentinels of the rear throat, defending the entrance of the air passages, upper and lower. They do not appear to play an important phago-

cytic rôle, from a biological point of view. From a phonetic point of view their normal rôle must evidently be to prevent in a certain measure the nasality (*nasonnement*) by maintaining the pillars in the midst of which they are placed."

Schmiegelow: "I look upon the tonsils as a part of the protecting system which is represented by all the lymphoid tissue to be found everywhere in the mucous membrane of the pharynx and nasopharynx."

Van Baggen: "The faucial tonsils have certainly a phonetic function. Their situation in the mouth at a place where the voice receives an essential part of its specific qualities allows us to admit this assertion. The muscles of the anterior and posterior pillars of the fauces between which the tonsils rest, are in constant movement, when we are speaking or singing. Their action combined with the movements of the muscles of the soft palate changes the shape of the voice passage at the back of the mouth when we are forming the different vocals or producing tones of different pitch. The position of the tonsils, situated as they are between the pillars of the fauces, are of great importance with regard to the exactitude and perfectness of those movements. Also for the resonance the tonsils are of great interest for the voice. With their spongy tissue, they can be compared to the felt in the piano which softens the tone and regulates the resonance."

ADDENDA TO QUESTION NUMBER ONE FROM ORIGINAL SOURCES.

Elaborate researches have been made into the anatomy and physiology of the faucial tonsils, and many minute anatomical data have been positively ascertained and repeatedly verified and authenticated by trained and able investigators.

Retterer, Journal de l'Anatomie, 1888, "The Origin and Evolution of the Tonsils": "Proved the existence of clear germinating centers in the follicle of the tonsils. Proved the existence of lymphatic vessels occupying the whole follicular mass of the tonsils, and forming a system of closed lymphatic canals which do not open into the connective tissue reticulum by stomata or by their extremities. He proved that the periphery of the lobules is more vascular than the center."

Marcel Labbé and Ch. Levi-Sirugue: "Researches on the Structure and Physiology of the Tonsils." Work done in the laboratory of Professor Landouzy, at the Laennec Hospital, Report published in the *Bulletin of the Anatomical Society of Paris*, July, 1899.

"What we have chiefly sought to do is to definitely determine the nature and distribution of the cellular forms which are met with in the interior of the tonsil, the constitution of the follicles and their relation to the lymphatic passages, and thus deduct as far as possible, their physiology. The tonsil was considered in times past as an organ designed to secrete mucus to lubricate the alimentary bolus, but this function does not be-

long to the tonsil, but really to the glands in groups which are outside of it."

"The phenomena of *absorption*, at the level of the tonsils has been studied experimentally. The epithelium prevents absorption which only becomes possible if it is destroyed, or if the substances are introduced under the epithelial bed, and even under these conditions the absorption is very slow."

The most exhaustive and valuable laboratory research investigations on the tonsils have been made by *Retterer*, *Labbé* and *Sirugue*. Laboratory investigations of *Stöhr*, *Von Lénárt*, *Poli* and *Frederici*, *Krause*, *Brieger*, *Goerke*, *Westenhoeffer*, *Merkel*, *Most*, *Grober*, *Hodenpyl*, *Flemming* and *Von Levinstein* are important. So are the clinical observations of *Jacobi* and *Fränkel*. The works of *Gulland*, *Fox*, *Spicer*, *Menzer*, *Lexer*, *Hendelssohn*, *Kümmel*, *Lindt*, *Kayser*, *Allen*, *Masini*, *Pugnat*, *Pluder*, *Schoenemann*, *Broeckhaert*, *Wright*, *Ashurst*, *Lichtwitz* and *Sabrages* and *Hicguet* are valuable. The works of *Goodale*, *Bosworth*, *Wood* and a few others are interesting. And beyond these are more than one thousand monographs that burden the subject.

Labbé and *Sirugue*: "From the *absolute analogy* of the internal structure of the tonsil, with that of the ganglions (lymphatic), the spleen and the *closed follicles* of the intestines, we have a right to conclude, contrary to the opinion of *Retterer*, that the tonsils are assimilable to the ganglions. Like them, they have a rôle in the hematopsis. The germinative centers of the tonsil

have certainly the same functions as those of the ganglions which are, as Flemming has shown, the localities for the production of leucocytes."

"There is also in the germinative centers of the tonsil, as in those organs of which the structure is analogous, an incessant cellular renovation. *Stöhr* admits the passage of leucocytes through the epithelium of the tonsil into the buccal cavity. The epithelium has the same protective rôle at the level of the tonsils as at the level of the rest of the buccal mucosa. The crypts augment its extent. Even in the normal state the epithelium is always more or less irritated, and above all at the *bottom* of the crypts, and we have seen that *it* is the seat of the incessant phenomena of cellular renovation. This epithelial irritation is due to the presence of dust, of small foreign bodies, which penetrate into the crypts; it is due, above all, to the existence *at the surface of the tonsil* of pathogenic microbes, which are found constantly in the normal state. *Netter*, *Bezanson* and *Griffen* have observed the constant presence of pneumococci at the surface of the tonsil, generally associated with streptococci. *Cornil* had already seen that tubercle bacilli meet at the surface of the crypts in normal individuals. in the same way as *Strauss* has observed on the surface of the nasal mucosa. These microbes, although in the crypts, *are on the exterior of the tonsil*, and it is the defense reaction of the epithelium which prevents their penetration. *It is only when the epithelium has been destroyed that the microbes penetrate, and in such case they rarely pass beyond the conjunctive bed; it is only in the*

case of the complete destruction of the tonsil that they may be found in the follicles."

Hodenpyl "confirmed the observation of *Rettener* that the lymph net occupies the whole follicular mass of the tonsils and forms a system of closed canals which do not open into the reticulum. *Hodenpyl* tried, but could not procure any absorption by the tonsil from its surface."

Grober: "*The Tonsils as a Port of Entry for tubercle-bacilli*": "The microbes having entered the tonsil, are mostly destroyed because the serum kills them; the power of the leucocytes as phagocytes kills them also. It is also possible that the microbes enter the system through the blood-vessels. The tonsils seem to be a less favorite settling place for tubercle-bacilli than the lymph glands, for we find scrofulous glands oftener than infections of the tonsils. Many authors have considered diseased tonsils as more liable to microbial infection than healthy ones. If that is true it has not been proven."

Metchnikoff: "Some years ago *Stöhr* demonstrated that the walls of the tonsils, and especially the tonsils and other lymphoid organs, are traversed by an enormous number of leucocytes, which execute a kind of immigration towards the cavities containing micro-organisms. This continual and normal condition is often termed *Stöhr's* phenomenon, and when we remove a particle of mucus from the surface of the tonsils of a person in good health we always find that it contains leucocytes, especially microphages, filled with micro-organisms of all kinds."

Von Levinstein: "As we find in normal tonsils

always follicles with cell-producing centers, we can claim with surety that in the normal tonsil young lymphocytes are produced, and that in the hyperplastic tonsils the number of newly formed lymphocytes is always considerably larger than in the normal tonsil. In the atrophic tonsil young lymphocytes are not found. What becomes of these young lymphocytes is not decided. That they are put into the circulation has to be considered doubtful, so long as it is not proved that the *vasa efferentia* of the tonsils contain a larger amount of lymphocytes than the *vasa afferentia*. So far this has not been proved and it will be difficult to prove because it is impossible to say which are the *afferentia* and which the *efferentia*. We have also to mention the fact that not a small number leave the tonsil by wandering through the epithelium to the surface of the organ, or into the lumen of the fossula. I have proved in my work that a considerably larger number of lymphocytes leave the hyperplastic organ than the normal tonsils. We know the fact that young lymphocytes are in the tonsils."

Fränkel: "The Infectious Diseases of the Pharynx."

"The ideas about the function of the tonsils have materially changed within the last thirty years, through the discovery of *Stöhr*, that an interrupted immigration of, *Stöhr* believes, leucocytes takes place from the follicles and the adenoid substances of the tissue surrounding the fossula. One sees the leucocytes passing through the epithelium. This immigration at certain

places is so strong that it is difficult to find the epithelium."

Jacobi (*Archives of Pediatrics*, July, 1906) : "Cases of membranous throat diseases behave differently according to their location. Now, whenever the membrane is limited to the tonsil there is very little, or no, glandular swelling in the neighborhood. On the other hand, if a membrane extends from a tonsil to its neighborhood, or starts at a distance from the tonsil, neighboring lymph bodies swell at once. Again, the treatment of this neighborhood shows itself almost immediately on the swelled glands. That is mostly evident when the seat of the membrane is anywhere in the posterior nares which excel by an immense network of lymphatics. On the other hand, when it covers the vocal cords, and *Morgagni's* fossa, both of which have a scanty network of lymphatics, there is no adenitis, nor any constitutional symptoms. These clinical observations have stood the test of time and must be reckoned with."

"One of the tonsil's functions is surely that of either preparing or storing leucocytes.

"It has not been possible, thus far, to verify the existence of afferent or efferent ducts of their own. The practical deduction from this is, that the tonsils have little or no connection with the lymphatic system. The number of blood vessels in the normal tonsils is not large, and it becomes greatly diminished when that organ has become the seat of repeated chronic inflammation."

Jacobi (*Medical Record*, August 19, 1911) : "Does not believe the removal of tonsils should

be done as often as some gentlemen seem to think. It was probable that the infection of rheumatism and scarlet fever through the capsule was not so frequent; it more likely took place through the soft lymphodes of the Waldeyer ring." He emphasized the desirability of keeping the nares clear, both before and after operation. "If there were greater care exercised in this respect, so many operations on the tonsils would probably not be necessary."

Sir Felix Semon (St. Thomas's Hospital Report): "I recommend that the tonsils be reduced in size:

- (1) If they interfere with respiration and lead to insufficient oxygenation of the blood.
- (2) If they lead to change in the character of the voice and to defective articulation.
- (3) If they lead to defective development of the face and chest.
- (4) If the chronic enlargement be attended by frequent attacks of inflammation of the tonsils themselves, by tumefaction of the cervical lymphatic glands, or by catarrhal conditions of the neighboring mucous membranes, notably of the Eustachian tubes. The common characteristics of these indications are, it will be observed, *that all of them are conditional*, not absolute. In other words, I recommend a surgical interference with enlarged tonsils only when they cause any of the serious symptoms above enumerated, and not merely on account of the enlargement *per se.*"

"The term, 'large tonsils' is one that can only

be used *relatively*. Comparatively large tonsils in a roomy pharynx are no doubt much less mischievous *per se*, than much smaller ones in a naturally very narrow throat.

"Supposing that the former do not interfere with any of the functions of the part nor lead to inflammation, etc., there is in my opinion not the slightest reason to interfere with them."

"It is by no means rare for children to be brought to me simply because it has been accidentally discovered that their tonsils are large. If in such cases I cannot satisfy myself that any of the graver consequences are present, I never interfere. It is only when I find that any or several of the symptoms mentioned in my list are present that I strongly insist on the undesirability of either leaving matters alone or losing precious time by having recourse to inefficient measures. *I wish to emphasize the distinction thus made, lest it should be inferred from the tone of my foregoing remarks, that I am a fanatical advocate of surgical interference as soon as an enlargement of the glands is discovered. Nothing, indeed, could be more alien to my intentions.*"

"I have no doubt that tonsils can be equally well removed by very different methods. *I consider total enucleation not only dangerous, but also generally superfluous.* The tonsil projecting under normal conditions nearly or quite up to, or even a little beyond, the palatine arches, it ought to be the aim of the operator to reduce them, in cases of hyperplasia, to their normal size."

Adami and Nicholls (Principles of Pathology, Vol. 2, 1909) say: "The tonsils appear to have an important function. While the lymphoid cells are themselves, to a limited degree, phagocytic, polymorphonuclear leucocytes in considerable numbers make their way from the blood vessels to the surface through the epithelial covering. These leucocytes are strongly phagocytic and their activity suggests that the tonsils form one of the barriers against the invasion of the system by pathogenic micro-organisms."

ADDENDA INTRODUCED ESPECIALLY FOR THE PURPOSE OF SHOWING THE WIDE DIVERSITY OF MEDICAL VIEWS AND CONJECTURES REGARDING THE FAUCIAL TONSIL.

Meeting of the *American Laryngological Association*, May 31, 1909, reported in *Medical Record*, September 25, 1909.

J. S. Gibb (Philadelphia), Paper on "Some Observations upon the Complete Extirpation of Diseased Tonsils," and Discussions by the Association. Gibb spoke particularly with reference to the method followed with the boys who entered *Girard College*.

"If it is necessary to remove a tonsil at all, it should be done completely. The wire snare was far more efficient than the tonsillotome in bringing about the described condition, viz.: removal of all diseased crypts. In ninety cases there is a fever between 99° and 101.5°. In nine cases in which the friable nature of the tonsillar tissue was very pronounced, and in which there was much dissection and the use of punch forceps called for, the fever rose to 102° and over. In two cases there was regurgitation of fluids through the nose. The fauces were indurated and there was sloughing over the area of the tonsillar wound."

E. L. Shurly (Detroit) "commended the views of Dr. Gibb but said that while we were all familiar with the results of tonsillotomy, we did not know so much about the remote results.

We must remember that *the tonsil has an internal secretion*, and that we do not know the possible results on the pharynx, stomach and contiguous or neighboring organs following the removal of all the tonsillar tissue. *Disagreeable atrophy might ensue.* We should indeed remove all diseased crypts, but have we done enough by so doing? *Should we not leave enough tissue to perform the functions of the tonsils?*"

Casselberry (Chicago) "did not agree with *Shurly*. We should always remove the tonsillar tissue completely. We should be sure to remove the tissue included within the velum, which he had named the 'velar' lobe."

Freer (Chicago) "used sharp instruments in freeing the tonsil from its adhesions."

Barnhill (Indianapolis) said that "whatever function the tonsil might have, there was plenty of other tissue in the throat which would take care of that function, especially since the tonsil was diseased. The tonsil pits often filled up after removal with granulation tissue, but sometimes adhesions formed between the anterior and posterior pillars, and these might *pile up on the tongue and bind it down.*"

C. G. Coakley (New York) said that "there had been in his cases anywhere from two to four weeks after operation a small mass of granulation tissue, which he removed by either the punch or nitrate of silver. There was often left an irregularity of the lower edge of the velum on the two sides, and *he wondered what effect, if any, followed in professional voice users.*"

G. Hudson-Makuen (Philadelphia) "thought that one great element of value in *Gibb's* paper was that he had been able to watch his cases so closely and report on their condition some time after operation. He would as soon think of leaving a decayed tooth root in the mouth as to leave a portion of a tonsil."

R. C. Myles (New York) "called attention to the basi-lateral tonsils he had described some fifteen years before. He had seen them extending at least three-quarters of an inch into the palate, and when the entire capsule had been removed there had been a cellulitis extending into the zygomatic fossa. Sections of the *superior constrictor muscles were too often removed along with the tonsils.*"

J. Price Brown (Toronto) "had been told by a music teacher of that city that several pupils had their *singing voices practically destroyed* by the removal of the tonsils."

W. K. Simpson (New York) "thought that we were too apt to base our opinion on the *immediate* sequel following removal of the tonsils, and that we might get from the filling-up of the tonsillar fossa with cicatricial and connective tissue an *interference with the muscular action of the velum which would be just as harmful as the leaving behind of a small portion of the tonsil.*"

J. O. Roe (Rochester) said "that patients sometimes complained more of septic trouble around the neck and of glandular swellings *after* the tonsil operation than before it. When a tonsil was diseased it was diseased all the way through, for the crypts went all the way to the

bottom of the tonsil, and if one left a portion behind one had increased absorption of the septic material in the region."

Emil Mayer (New York) "deprecated the *use of the finger*. *Modern surgery* called for the use of rubber gloves. He uses a blunt dissector. He thought that too much emphasis had been laid on the amount of blood in these regions."

Meeting of the Societe Belge d'Otologie, de Rhinologie et de Laryngologie.

Reported in La Presse Oto-Laryngologie Belge, No. 7 of 1910. A review and discussion of paper presented by *Hicguet* on "*The Functions and Utility of the Palatine Tonsils. Study of the Physio-pathology of that Organ.*"

Hicguet, "in presenting his paper, ran over in a rapid resumé the diverse theories held on this subject since those days of *Kölliker*, who does not attribute to the tonsil any physiological rôle, down to the quite recent opinion of *Frederici*, who considers that organ as the agent of elimination of harmful and infectious substances, a function in which the tonsil comes to the defense of the organism. *Hicguet* remarks that we must accord much more credit to the work of the physiologists than to that of specialists, when these latter constitute themselves improvised laboratory operators. He reviews the work of *Stöhr* and *Flemming* and also the article of *Bickel*, in which those authors affirm that the gland itself has, in total, little importance.

"The leucocytes, which form in the tonsil, direct themselves in part toward the surface of the organ: the others, in a more notable proportion,

pass by the *vasa efferentia* into the general lymphatic circulation, and thereon into the blood. It is, so to speak, assigning to the tonsil a rôle of defense. *Goerke*, inspired by the works of *Brieger*, has set forth that latest theory, so much in opposition to *American* authors, who see in the tonsil a mischievous organ and even dangerous to the organism by reason of the infections which may be carried in by that path. *Brieger's* views need to be confirmed," said *Hicguet*, "and," he concludes, that "in the actual state of our knowledge, it is very difficult to say whether the normal tonsil is useful or harmful. Two theories remain before us: the one considers the tonsil as an auxiliary to the organic defense, and the other as a source of infection. Both appear to him as exaggerated, for it seems evident to him that the hypertrophied and diseased tonsil could not come to the defense of the organism, while the normal tonsil could not be a source of infection."

Discussion.

Cheval "regrets his inability to come to the support of his conclusions. He put in parallel the last three paragraphs with the conclusion of the first paragraph. The author says, 'The one of the two theories considers the tonsil as an organ of defense,' and 'That theory seems to apply to the normal tonsil'; and 'On the other part, it is not possible to affirm that the normal tonsil is useful or harmful.' It seemed to him that *Hicguet* had been able to conclude in the affirmative. The *normal tonsil is a useful organ*, because in the actual state of our knowledge, it is demon-

strated that it comes to the defense of the organism. In his conclusion, *Hicguet* says further: 'While the normal tonsil could not be a source of infection.' *Even conditionally, that phrase is too absolute.* In fact, aside from certain humors which have a bactericidal power, the defense of the organism against infection, which watches it at every instant, is exercised principally by the phagocytes. *For the mechanism of infection does not sensibly differ from the mechanism of defense:* there is not between these two mechanisms but one difference, if more or less. In effect: (a) That the virulence of the germ augments the chimiotaXism of the leucocytes, announces to them the presence of a germ with its infectious qualities: there is hypopolynucleose; the polynuclei desert the field of battle and take refuge in the smaller circulation and in the deeper organs (spleen, etc.). There is, in consequence, infection more or less profound: a single failure of the phagocycles may then provoke an infection. To this hypopolynucleosis succeeds a hyperpolynucleosis which may phagocytose the germs and avoid the diffusion of the infection; (b) the phagocyte itself may lose certain of its properties, following a weakening of the general condition; for example, sometimes also from some entirely different local cause (traumatism, surgical intervention, etc.) and the germ then triumphs.

"In other terms, the leucocyte triumphs over the microbe in the defense of the organism: the microbe triumphs over the leucocyte in infection,

and these alternatives may succeed each other many times in the course of an existence.

"But at the precise moment of this weakening or failure, more or less prolonged, of our white corpuscles, the tonsil may appear normal. It will be at least in an ante-pathologic condition, and even normal in certain cases where the germ is not phagocytosed, or only slightly so. From this, can we write that the normal tonsil cannot be a source of infection?

"I thus approach the opinion of *Broeckaert*. It is evident that the pathologic tonsil may be a source of infection and has no longer the power of coming to the defense of the organism; per contra, in a state of perfect health and under ordinary conditions, the physiological tonsil has for its function the assisting in that defense. But sometimes, also, its state of defense weakens, and it may become a source of infection."

Tretrop "desired to make some remarks in detail: Infection through the tonsil, taught as an hypothesis, is for *Tretrop* a reality. It is not astonishing that the tonsil, a lymphoid organ in relation with the sub-adjacent lymphatic ways, may become infected, and transmit farther on this infection, without even necessarily becoming diseased on its own account."

Escat "addressed his compliments to *Hicguet* and *Broeckaert* for their papers, so supported by documents and so precise. He is in accord on the majority of points with these gentlemen, but nevertheless, makes some remarks."

Escat "attaches a certain value to the theory of *Allen* as to the hypothesis of a tonsillar func-

tion *beginning and ending with the skeletonic growth.* The fact that the tonsils normally atrophy from the time that this growth terminates, justifies, to a certain point, this hypothesis. Researches made by *Lichtwitz* and *Sabrages* on the modification of the hematologic formula verified before and after the surgical ablation of adenoids, seems to justify the hypothesis of a dystrophic condition connected with the alteration of the internal secretion of the ring of *Waldeyer.*"

Capart, Jr.: "Not only the palatine and pharyngeal tonsils atrophy normally at a certain age, but it is the same with the lymphatic tissues of the digestive tube, and of the organism in general. Also, it is by an evident error that we see the anatomists describe in an adult a palatine tonsil of an appreciable dimension. It is following interior infections that this organ loses the possibility of self-absorption at a certain age. We may recall in favor of the hypothesis of an internal secretion of an unfavorable influence, the remarks made recently by *Lermoyez*. 'Chronically inflamed adenoids appear to lead to different troubles from those observed following nasal obstructions due, for example, to atresiae or to fibrous polypi. On the other hand, the ablation of adenoids even reduced, often leads to an amelioration not in accord with the respiratory troubles which it could bring on."

Poli (Genoa) spoke on "the theory of the elimination of microbes by the tonsil," and was supported by his associate, *Frederici*. In support of that view, he showed microscopic prepara-

tions of the tonsil taken from a dog in which *Frederici* had injected into the pleura a culture of the bacillus of *Koch*. The presence of bacilli were perceived in the tonsillar crypts."

Schiffers (Liege): "When we speak of the function of an organ, it is necessary to consider above all, its texture. That of the tonsil corresponds to the texture of the lymphatic ganglions. It acts, then, as they do. It must be added that the tonsils being placed at the entrance of the superior respiratory and digestive tracts, and disposed all on the surface, must also have another function. This is, according to the author, a function of defense. The tonsils are leucocytic organs. Histological examinations show that the leucocytes are derived from the epithelium of the tonsillar crypts."

Hicguet responds that "the diversity of theories which he has met in his work has put him to much pains to form the conclusions at the end of this report and explains why he is not enthusiastic about any of them. He supports in part the observations of *Cheval*, but puts them in opposition to the opinion of *Escat*, who does not seem to be a partisan of the phagocyte theory, and who, on the contrary, accords a more particular attention to the theory of *Allen*."

To *Tretrop*, who "recalls that the tonsil is often the port of entry of infection, *Hicguet* responds that in his paper he does not consider this fact hypothetic, except in the sense of the *American* authors, who consider the tonsils as a danger."

"As to the analysis of the blood, it could not

give serious results, except in the case of 'hospitalized' patients."

At the same meeting of the *Societe d'Otologie, de Rhinologie et Laryngologie*, also reported in the *La Presse Oto-Laryngologie Belge*, there was a paper presented by Broeckaert, entitled, "*Advantages and Disadvantages of the Ablation of the Palatine Tonsils.*"

Broeckaert (*Gand*), at the beginning of his paper, "declares that the theories proposed so far do not satisfy him, and that, as *Levinstein* has very justly remarked, 'The question of the true rôle of the tonsils is yet to be solved.' In the first chapter the author examines the arguments that may be of value in favor of the suppression of the tonsils; he then studies the various infections to which the palatine tonsils appear to serve as a port of entry; he then describes the remote troubles to which these infections give rise.

"The second part of the work is devoted to an examination of the disadvantages resulting from the ablation of the tonsils, and the measures to be taken to avoid the complications following that operation."

Discussion.

Escat (Toulouse) is "completely in accord with the writer concerning the technic of the ablation of the palatine tonsils. The adenoid tissue is not neoplastic tissue: why then be so bent upon extirpating it as radically as if it were a cancer? It is to be feared that if tonsillectomy following the *American* method becomes very common, the cases of *operatory hemorrhage* will

multiply and that the good reputation of tonsillectomy will suffer from it."

M. Delsaux (Brussels) "has paid attention to two types of tonsils, very distinct: the simple hypertrophic and the '*enchatonéed*' lacunary. While the former are rarely accompanied by a ganglionic invasion of the neck, the others, profoundly infected, have transmitted their infection to the lymphatic cervical barriers. Thus, when we remove the tonsils of the first variety, we almost never perceive a febrile reaction. It is not the same with the '*enchatonéed*' tonsils, accompanied by cervical ganglionic swelling. And this may be conceived, since the infection is localised in the tonsil, on the one part, and that on the other it has passed the limits of the organ in view. The traumatism of the tonsillectomy exalts the microbian virulence, and the fever appears. *Delsaux* is supported by the statistics of about fifty cases."

Schiffers (Liege): "When it concerns the setting forth of therapeutic, and above all, of operatory conditions, it is necessary to consider the normal and pathologic state of an organ. Evidently, if the tonsil is inflamed, its function is prejudiced by it. We must distinguish the true from these false hypertrophies. The tonsil often retrocedes because there is no true hypertrophy. *The volume of a tonsil does not constitute an absolute indication for an operation.* The speaker has remarked this with reason. According to *Schiffers*, the tonsillectomy is an operation to be completely advised when it concerns solely the avoidance of new inflammations. It is not

imposed, *and is not justified except in cases of malign tumors* of the tonsil. *The tonsil itself*, is, however, *very rarely attacked by suppuration*: there exist certainly, suppurative follicles, *but the interstitial tissue itself does not suppurate*. When we speak of tonsillitis with suppuration, it concerns, in the immense majority of cases, the *peritonsillitis*. *It is the peritonsillar tissue which forms the abscess, and most frequently it is at the superior pole of the tonsillar loge where the pus must be sought*. In many cases of relapse it is necessary, first of all, to liberate the tonsil, principally in front and rear, which suffices to definitely cure the patient."

Broeckaert (Gand) : "Thanks *Escat, Delsaux* and *Schiffers* for the important part they have taken in the discussion of his paper and partakes completely of their opinion. In spite of the eloquent pleading of *Jacques* in favor of tonsillectomy with the hot instrument, *Broeckaert* could not come to the support of this mode of intervention, which, as *Tretrop* has said, is painful and in no way avoids hemorrhages and infections.

"*One question to which it would be difficult to respond is that of knowing what is to be understood by a normal tonsil*. When does it become hypertrophied, and when is it pathologic? We must not forget that, even normal, the tonsil presents an irregular form with innumerable crypts which are true microbian receptacles. Two points stand out from this discussion:

"1st. We are in accord in admitting that there are infectious '*enchatonéed*' tonsils, which are the most dangerous and claim our intervention.

"2nd. Such intervention, in these cases, must be radical, without falling into excesses."

At the same meeting of the *Societe d'Otologie, Jacques (Nancy)* presented a paper on the "*Considerations on the Ablation of the Tonsils.*"

"Among the multiple lymphoid agglomerations which are arranged along the paths of the air and of the aliments, the palatine tonsils partake, with the pharyngeal tonsils, an unfortunate fragility, which translates itself by a remarkable receptivity in regard to pathogenic germs and a consecutive aptitude for hyperplastic degeneration. Also we should relegate to the ranks of the Utopias, the seductive theory which makes of these organs intangible citadels of the digestive and respiratory passages, though they do not constitute, in reality, in the greater number of cases, more than a double hearth of infection, with continual menace of the lymphatic passages. Every tonsil recognized as chronically inflamed should be radically suppressed."

"The different methods of partial amputation are inoffensive or dangerous. The section with the hot instrument, after pediculisation of the gland, assures a rapid and complete excision. It is exempt from danger, if it is practised with a wire moderately heated, applied to the exact limit of the tonsil and the pillars."

Tretrop (Antwerp) : "Tonsillectomy, the Indications, the Results."

"The tonsil is the seat of local inflammations, and the port of entry of general infection. The author has observed it in tuberculosis, etc. The chronic inflammations, bringing on close ad-

hesions with the pillars, create a pseudo-tuberculosis. Tonsillectomy is the chosen method in the adult to cure the old inflammations and the pseudo-inflammations. *Tretrop* passes in review the methods most employed and shows the advantages of each of them. He insists on the necessity of treatment preparatory to the intervention."

Meeting of the British Medical Association, Section of Laryngology, July 29, 1910, reported in the Journal of Laryngology, Rhinology and Otology, of October, 1910. A paper presented by *Dan MacKenzie*, on "*Enucleation of the Tonsil*"; and the discussion by members of the *Association*.

"Complete and entire removal of the hypertrophied tonsil by dissecting it out of its bed in the pharynx has come to be the operation *de rigueur* in *America*. Those who advocate enucleation as the routine operation summon logic to their aid.

"If, they say, it is improper in the surgical sense not to remove the whole of a lymph node or nodes when they are diseased, in the neck or elsewhere, then surely it is equally improper to treat an enlarged tonsil—which is, after all, a lymph node—by partial excision, seeing that in doing so we leave behind undisturbed a certain amount of diseased gland tissue. At first sight this argument looks unassailable, but it rests upon an assumption—namely, that an enlarged tonsil is invariably a diseased tonsil. Comparison of the enlarged tonsil with the enlarged lymphatic gland of chronic tuberculosis is not quite

accurate. For, as it is well known, no pathologist has so far succeeded in proving to the satisfaction of all that ordinary hypertrophy of the tonsils is generally, or frequently, or ever at all, due to tuberculous infection such as that which so often induces chronic cervical adenitis. In opposition to the opinion which would lead us to take up enucleation as the routine operation for hypertrophy of the tonsil, we can point to the fact that the ordinary tonsillotomy efficiently performed *is seldom followed by a recurrence of the hypertrophy.*

"There is no doubt whatever that enucleation is the more severe operation; it takes longer to perform; it inflicts a deeper and more extensive wound.

"Is there a class of cases in which enucleation is to be preferred to tonsillotomy or the typical operation? I think there is. *Enucleation should always be performed when the tonsil is diseased and not merely hypertrophied.* Secondly, the tonsils should be enucleated in patients who are suffering from tuberculous disease of the cervical lymphatic gland. There is another variety which should be dealt with by complete removal. I refer to what is known as the 'buried' tonsil. One would be very cautious of recommending enucleation to a *professional singer*, for obvious reasons."

Discussion.

St. Clair Thomson said: "The operation described by *Dan McKenzie* was no new departure. It was as old as *Celsus*, and he himself

had published a method of enucleating the tonsil many years ago."

Dundas Grant said that "he exercised a certain amount of eclecticism in the choice of operation. He considered that the leaving of a portion of tonsil tissue, as such, was not a serious matter and indeed possibly a beneficial one so long as the crypts were cleared away. Moreover, the protective character of the capsule had already been pointed out, and its complete removal was open to question."

Luc said: "The wire snare was a troublesome instrument to use, and recommended in its stead the so-called 'rigid cold snare' of *Vachez*."

Watson Williams asked: "What definite information did we possess regarding the physiology of the tonsils? In rheumatism, which had been ascribed to tonsillitis, he had frequently found the tonsils atrophied or absent. He did not think, therefore, that enucleation was the best operation, but the question was one which required thrashing out."

Lambert Jack held that "enucleation should never be the routine operation. Removal of the tonsils by the guillotine in the hands of a skilled operator gave results as good as any other operation. *The need of getting every crypt away was exaggerated.* The throat has many crypts and to remove them all would be impossible. Mr. *Hett's* statistics, referring as they did to hospital cases, were fallacious, because at hospitals the operation was most incompletely performed."

Syme said that "Enucleation was not necessary in every case."

W. Stuart-Low thought that "Enucleation was best suited for adults with large tonsils and not for children. He feared that *Hett removed muscle as well as tonsil* in operating."

Seccombe Hett said that "If *Stuart-Low charged him with removing muscle, his reply was that *Stuart-Low left the capsule behind.**"

Dan McKenzie in reply said that "The discussion had revealed *considerable discrepancy of opinion* with regard to the best way to operate. It also showed that the principles laid down in his paper with regard to enucleation in disease and recurrent hypertrophy had received a general assent."

The president, H. Tilley, said that "the trend of opinion seemed to be that the cases should be selected for each operation."

Seccombe Hett (*Meeting of British Medical Association, July 29, 1910. Reports in Journal of Laryngology, Rhinology and Otology, October, 1910*). "*The Anatomy of the Capsule of the Tonsil and Its Significance in the Treatment of Diseases of the Tonsil.*"

Describing the anatomy of the tonsillar capsule, *Hett* "observed that the upper portion is surrounded by a loose areolar tissue space, the peritonsillar space, which is limited below by the insertion of muscular fibres from the superior pharyngeal constrictor into the capsule. In the act of swallowing, the upper part of the tonsil is pressed downward and inwards between the pillars in such a way as to encourage the discharge of secretions from the supra-tonsillar fossa."

Meeting of the American Laryngological As-

sociation, May 30, 1911, reported in the *New York Medical Record* of September 16, 1911. Report of paper presented by *Henry L. Swain* (*New Haven*) on "*Are Tonsils a Menace or a Protection?*" and the discussion by members of the Association.

Swain discussed the question as answered, "First, in the practice of throat surgeons all over the country. As they almost universally were adopting the operation of tonsillectomy whenever they attacked the tonsils, the inference was that the latter were surely of account and always a menace. Answering the question from the anatomical and physiological standpoint, the evidence adduced was such that it could be readily proved that the tonsil was to all intents and purposes a lymph node and was of just as much importance, no more, no less, as any other node. He called attention to the fact that the tonsils (faucial) had lymphatic trunks *leading into them, which drained from the nose and palate*, so they had *a very definite office in caring for this lymph, a very different viewpoint from the usual one of being a mere retentive area for matter soaking into them from the mouth*. *Being thus, when in health, an active agent of protection to the system, the tonsil must, like the whole lymphatic system, be of relatively greater importance to the very young child than to the adult.* These two facts were strengthened by the additional observation that as the healthy normal individual always had such tissue, which began to functionate early in life in the adenoid tissue in the nasopharynx, in the faucial tonsils, in childhood, and

in the lingual tonsil in later adult life, it would seem absolutely proved that the body required some such physiological action of some such tissue for its proper development or in its economy, i.e.: a definite function for lymphoid tissue. Taking this as true, it would be absolutely illogical to remove any of it except for just cause, and this led Swain to deplore tonsillectomy, complete removal of the tonsils, as an indiscriminate routine procedure in young children, especially when this was accompanied by complete adenoidectomy. The adenoidectomy was to be commended—too thorough an operation was rarely possible—but in early childhood a portion of the healthy faucial tonsil tissue could be well allowed to remain. The system might have need of it. When diseased, any of the good operations for tonsillectomy could be used, but he felt that the teaching should be that, even in adults, there were other methods of bringing about a satisfactory and safe condition of the tonsils. These latter he almost universally employed by preference and such patients had, at least, the benefit of whatever protection the saved tissue could be to them."

Discussion.

George B. Wood (Philadelphia) "objected to the views held by the essayist, and stated that he had proved the lymph flow in the tonsil an efferent current. He did not believe it to be possible to tell macroscopically a diseased tonsil. He advocated in all diseased conditions the complete removal of the tonsil."

J. G. Wilson (Chicago) "agreed with *Dr. Swain* that the physiological activity of the tonsil was principally confined to fetal and infant life, but did not consider it as a pure lymphatic gland."

W. E. Casselberry (Chicago) said "he had never seen a particle of detriment to either the child or adult resulting from the total excision of the tonsil, but explained this on the basis that *there were supplementary tissues to continue its functions.* He agreed with *Swain* that during childhood the tonsils should *never* be removed unless *definitely* diseased, but advocated their absolute removal if operated upon at all."

John N. Mackenzie (Baltimore) "emphatically voiced his disapproval of the indiscriminate removal of tonsils so largely practiced at the present time, and considered it the duty of every laryngologist to make the conditions warranting tonsillectomy plain to the general practitioner."

C. G. Coakley (New York) "called attention to the fact, also referred to by *Swain*, that the tonsils in children and in adults were entirely different in function; in adult life it was classed more as a pathological than as a physiological organ. He mentioned the fact that frequently in adults with rheumatic diathesis the removal of the tonsil which has caused quinsy, etc., would show an abeyance of these peculiar manifestations. It was his opinion that tonsils should be enucleated and not cut off, and his experience had been that the children in whom this procedure had been carried out because of disease of

the tonsils, as a general rule became markedly improved in health following the operation."

A. Coolidge, Jr. (Boston) "discussed the etiology of acute tonsillitis, referring to the recent epidemic in Boston, which was at first traced to the milk supply, but later became general throughout the city. He considered, in view of the mode of onset, that the condition in the tonsil pointed rather to an efferent than to an afferent flow of the septic micro-organisms or their toxins."

R. R. Shurly (Detroit) "deprecated the removal of tonsils unless proved to be diseased. In many hundreds of tonsillectomies he had seen nothing but favorable results."

Bliss (Philadelphia) "considered the stumps of tonsils remaining after partial removal to be a great menace to the health of the individual."

LETTER OF MOURE.

Translation.

Question 1. I consider that the normal tonsils have physiologic, biologic, chemical and phonetic functions.

There is no doubt that they are the advanced sentinels of the rear throat defending the entrance of the upper and lower air passages.

They do not appear to play an important phagocytic rôle, from a biological point of view.

From a phonetic point of view, their normal rôle must evidently be to prevent in a certain measure the nasality by maintaining the pillars, in the midst of which they are placed.

Question 2. What I have said above contains the response to the *second question*.

Question 3. It is difficult to say what are the effects of allowing the ablation of the tonsils in view of the fact above all, that, at least in our country, the *complete ablation* is never performed, but only a removal more or less complete and that in consequence there always remains enough follicles to fulfill the rôle devolving on that gland, which, like the greater part of the lymphatic organs, atrophies little by little with age.

Question 4. After the ablation of the tonsils a change of the voice is above all observed when the subject has already been accustomed to singing and that in consequence he has habituated himself to emit the voice with the two tonsils situated between the pillars.

If the forms of certain hypertrophied tonsils

embarrass the speaking voice (phonation), there is no doubt that there is then, after their removal, a very appreciable modification in the emission of the speaking voice among young persons.

Question 5. I believe that in a general way, one should not remove the tonsils when they are not of excessive size, or are not inflamed; in a word, that they are not the point of departure of local infection, frequent or distant (caseous, suppurative tonsilitis). They are organs as useful as the ganglions when these latter are not degenerated.

(Signed) MOURE.

Bordeaux, January 28, 1910.

Question Number Two.

What are the functions of the faucial tonsils?

Answers:

Eugene Hodenpyl: "Unknown."

A. Coolidge, Jr.: "I do not know."

G. Hudson-Makuen: "I do not know."

H. Holbrook Curtis: "To prevent the ammonic fluid entering the respiratory tract by prenatal coalescence with the pharyngeal and lingual tissues constituting the ring of *Waldeyer*."

Edwin Pynchon: "I am disposed to think that they have no function except to cause trouble, evidenced by the invariable improvement in one way or another after their complete and correct removal. If they have any function, nature evidently supplies other means to fully and easily take their place, therefore the system suffers no disadvantage from their loss."

William E. Casselberry: "The adoption of tonsillectomy as the ideal operation, even though the ideal be not always exactly fulfilled, lends more importance to the inquiry with respect to the protective and other functions of the tonsils. The tonsillar crypts always contain pathogenic germs against which nature seeks to provide by phagocytosis, the engaging polynuclear neutrophiles, however, coming not from the lymphoid tissue, *per se*, but from the blood, so that this is a protection only against the evil of the tonsils themselves. More stress is now laid upon the bactericidal properties of the juice of lymphoid glands and upon the vaso-tonic effects of an in-

ternal secretion, but it will be remembered that aside from the tonsils there are other lymphoid tissues which seemingly are quite adequate to care for these functions. Certain it is that no functional ill effects are discernible from tonsillectomy."

George B. Wood: "See answer to question one."

Charles H. Knight: "I do not know."

J. E. Newcomb: "I believe that the normal tonsil is the origin of cells, phagocytes, to take care of deleterious substances introduced into the mouth."

Joseph W. Gleitsmann: "I believe the tonsils to be an organ for defense (*Goerke, Archiv. für Laryngologie XIX*, 1907, page 244), (*Jonathan Wright, New York Medical News*, March 4, 1905), (*Brieger, Archiv. für Laryngologie, XII*, 1902, page 2500)."

George B. Rice: "I believe that the lymphoid ring in a normal state, including, of course, the faucial tonsils, has a protective function. The conclusions of many observations would seem to warrant this belief."

E. B. Gleason: "They are lymphatic glands. Aside from the functions of similar structure, I am not prepared to give an unqualified endorsement to any of the somewhat numerous theories as to the functions of the tonsils."

Wesley Mills: "I think likely: (1) absorption, (2) possibly they furnish an internal secretion, (3) they may act as elaborators of white blood cells."

George L. Ross: "This is covered by question number one."

St. Clair Thomson: "I think this function is a protective one in early childhood, possibly only up to the completion of the first dentition. The tonsils may defend the organism from the risks attendant on a small child's omnivorous tastes."

J. MacIntyre: "See answer to question number one."

E. M. Holmes: "I am of the opinion that one important function of the tonsil (faucial) is that of a very active lymphatic gland, acting (as a fort and battlefield) against infection arising in upper air tracts. We have all seen many attacks of marked activity in the tonsils after injury to nose (operative or other) and I am at present studying the frequent cervical adenitis following these causes where there is no faucial tonsil. The results of my studies thus far are really very marked."

John Mackenzie: "I do not know."

William G. MacCallum: "Probably to act as guards against infection—to abort and destroy infectious agents. Obviously little is known as to the exact function of the tonsils, but they apparently form part of the lymphoid apparatus distributed throughout the digestive tract, and are comparable to the Peyer's patches, etc."

Frank E. Miller: "Lubrication principally. If tonsils are entirely cut out with capsule and adjacent glands, there will be glandular secretions from the pharynx, base of the tongue or back of pharynx."

A. Barth: "Secretary and resorptive action."

The latter action is germicide (protective against infection) but under circumstances leads to local and general infection."

Luc: "Same answer as to question number one."

Castex: "The palatine tonsils have not appeared to me to have any other function than that of the other superior vascular glands of the body (lymphatic ganglions, etc.)."

Moure: "What I have said in response to the preceding question contains the answer to question number two."

Escat: "I am of the opinion in accord with *Allen*, that the tonsils (palatine, lingual, tubaire) secrete a principle, the nature of which it has been unable as yet to determine, but which should be useful in the development and to the *growth of the skeleton*. I have found a reason for this in the fact that the normal tonsils atrophy normally about the age of eighteen to twenty years, from the time that the subject has become fully an adult. This normal atrophy is manifest and striking for the pharyngeal, tubaire and lingual tonsils; it is more defaced and more dissimulated in the faucial tonsils by reason of their globate form; this is why, in spite of the atrophy, there always persists a small nut or nucleus, but this atrophied tonsil is nothing but a stump of a tonsil; when that atrophied tonsil has conserved in the adult, a certain *grandeur* (*groneur*), it is because it is sick: it is because the chronic inflammation has counteracted the physiologic atrophic involution."

Massci: "I do not give great importance to the opinion according to which the faucial tonsils may render easier deglutition, nor I think sufficiently demonstrates that they are glands of internal secretion."

Van Baggen: "For my answer to this question see the first answer."

Von Chiari: "Formation of leucocytes, especially in children."

Question Number Three.

What effects have you observed as being directly due to the removal of the faucial tonsils?

Answers:

H. Holbrook Curtis: "Only good effects."

G. Hudson-Makuen: "Only good effects."

A. Coolidge, Jr.: "No serious injurious effects."

George B. Wood: "I have never seen any bad effects from the removal of the faucial tonsils."

Edwin Pynchon: "After twenty years' experience, covering at least 3,000 cases, I have never observed any other than favorable effects, aside from temporary inconvenience after the operation. The general health has always been improved, only exceptions are question four."

William E. Casselberry: "No evil effects, only good. Total tonsillectomy has been my practice for a period of years long antedating our present more technical method, and I have recorded statistically the immediate and ultimate results from a total of 600 double operations upon private patients, among whom are relatives, friends and acquaintances, together with other patients re-examined years afterward, for a considerable number whom I have been able to ascertain the last state of the patient. In none has any harm resulted, in many inestimable good. In none did I have any reason to regret having made total tonsillectomy, my sole regret having been on account of those cases in which a remnant of tonsil had escaped removal."

Charles H. Knight: "Improvement in general and local conditions, voice resonance and breathing, subsidence of glandular swellings, etc."

Beverly Robinson: "When advisedly done—many and good."

George B. Rice: "The enucleation of pathologic tonsils in my experience is followed by less frequent sore throats, improvement in the speaking and singing voice, and a change for the better in the general health."

J. E. Newcomb: "Improved breathing and lessened liability to sore throats."

Joseph E. Gleitsmann: "No deleterious, only beneficial ones."

E. B. Gleason: "From the removal of hypertrophied or diseased tonsils improvement in the voice and hearing when there was middle ear catarrh, usually also improvement in the general health."

Eugene Hodenpyl: "In pathological tonsils the usual well-known improvement ensues."

Wesley Mills: "None that were unfavorable."

George L. Ross: "Healthy and unimpaired action of the oro-pharynx, freedom from the previous mechanical impediment of hypertrophy and in atrophic cases relief from suffering (though this is not invariable)."

John N. Mackenzie: "I cannot recall a high fatality or serious complication after tonsillotomy in all the years of my experience; in suitable cases it is always productive of good, and when properly done is practically just as effective as tonsillectomy: neither can ever be absolutely complete; but the risks of tonsillotomy are as

nothing compared with the accidents which follow tonsillectomy, to say nothing of its long roll of death."

J. MacIntyre: "Question three is an exceedingly difficult one for me to answer because you refer to faucial tonsils without any reference to naso-pharynx, lingual tonsils or, indeed, to the adenoid tissue in the nose and throat. I would find it very hard to make any observations upon the faucial tonsils alone. The same remark applies to question four."

St. Clair Thomson: "The usually noted and well-recognized improvement in health."

E. M. Holmes: "A much larger percentage of cervical adenitis following nasal and nasopharyngeal infection."

Massei: "Improvement of voice (when enlarged); improvement of general health (when representing the mechanical impairment to the free respiration); less occasion to sore throat or infections which may originate from that point."

Lubet-Barbon: "I have never observed any troubles from the removal of the tonsils."

Luc: "I generally observed diminution or suppression of the symptoms due to the hypertrophy of the glands."

Moure: "It is difficult to say what are the effects following the ablation of the tonsils in view of the fact above all, that at least in our country, the complete 'amygdalectomie' (extirpation) is never performed, but only a removal more or less complete, and that in consequence there always remains enough follicles to fulfill the rôle devolving on that gland, which, like the greater part of

the lymphatic organs, atrophies little by little with age."

Castex: "I have never observed any but good results to the condition. I do not interfere with the anterior or posterior pillars."

Escat: "I have observed nothing but good effects—amelioration of the general condition, exaggeration of development in the child. I attribute the good result as much to the cessation of physiologic troubles resulting from the vicious internal tonsillary secretion from the chronic inflammation, as to the cessation of the mechanical interference brought on by the hypertrophy—no *cachexia tonsillipriva* has been observed because, even in the most radical ablation of the tonsils, there is always left a little adenoid tissue."

A. Barth: "Rarely any, always a bleeding easily subdued. Once a necrosis progressive, which yielded to antiseptic washings. Often weak children recover quickly. Scrofulus habitus disappears. Same thing in removing pharyngeal tonsils."

Frank E. Miller: "All effects due to abnormal mucous membrane thus affected."

Schmiegelow: "When I remove faucial tonsils it is always because they are diseased or inclined to be affected with tonsillar angina; and the removal has always prevented new attacks; other effects I have not seen."

Van Bagen: "Only in two cases during my experience of eight years the removal of the faucial tonsils was necessary. In both cases the tonsils were of abnormal size. In one of those two cases there was no regular movement of the soft

palate and of the pillars of the fauces; especially when forming the initial vocals a spasmodic contraction of those parts took place, whereby the swollen tonsils were strongly protruded. Every attempt to correct the action of the muscles of the soft palate and the pillars of the fauces remained without any results because of this projection of the tonsils. After their removal, the desired effect was obtained by carefully applied exercises."

Von Chiari: "The pharynx will be more roomy."

LETTER OF VON CHIARI.**Translation.**

- (1) The tonsils most probably serve the purpose of forming leucocytes.
- (2) Formation of leucocytes, especially in children.
- (3) The pharynx will be more roomy.
- (4) If in older mammals very large tonsils which have very much stretched the palatine arches have been removed to the bottom of the sinus-tonsillaris, the arches then lose their prop and on account of the relaxing of the muscles of the arches they cannot thereafter contract efficiently. Therefore, the resonance of the throat gets flabby walls, so that the strength and fulness of the tones suffer.
- (5) No.
- (6) You will find a new detailed summary of my remarks in the book called:

Die Krankheiten des Rachens,
Von O. Chiari
Leipzig und Wien,
Franz Denticke,
1903.

Yours truly,
(Signed) O. CHIARI.

Vienna, 18th October, 1910.

Question Number Four.

Have you noted phonetic changes after the removal of the faucial tonsils?

Answers:

H. Holbrook Curtis: "Always improves the clearness of tone and lessens vocal fatigue."

G. Hudson-Makuen: "Yes, changes for the better."

A. Coolidge, Jr.: "No important ones, except in adult singers, who in one or two cases partially lost delicate control. This would have been unimportant to anyone else."

Edwin Pynchon: "When properly done with proper after treatments to prevent growth of exuberant granulation tissue, the effect has always been favorable, increasing the vocal range of singers and correcting former tendency to hoarseness when such existed either in singers or speakers, as lawyers, etc. When proper *after treatments* are neglected a new growth of tissue may interfere with free motion of the pillars and soft palate, though this has occurred rarely and the effect on the voice has been slight."

William E. Casselberry: "In no instance has any ultimate harm resulted from the operation; nothing but good. **Lambert Lack** reports a case of loss of singing voice. My series includes but eight prominent vocalists and perhaps an equal number of public speakers, in all of whom the voice was improved, but the number would be larger were it not that in singers I have limited the operation to those in whom the tonsillar dis-

ease itself seemed about to destroy the voice, so that I believe that vocalists form no exception to the rule, that wherever the tonsillectomy is really indicated, enhanced general vigor and vocal sturdiness may be expected to result from the operation."

George B. Wood: "Personally, no, except to clear the voice."

George B. Rice: "Yes."

J. E. Newcomb: "No."

Charles H. Knight: "Often very marked. Increase in volume and metallic quality, the latter diminishing as the palatal muscles adapt themselves."

Joseph W. Gleitsmann: "Consider carefully removal of hypertrophied (not otherwise diseased) tonsils in professional singers. If removed, influence on voice is easily and quickly relieved by vocal studies, with benefit to patient."

E. B. Gleason: "Generally a great improvement in the voice after the removal of hypertrophied tonsils. Great impairment of the singing voice of a professional female singer from a tonsillectomy done in New York probably result of great change in size of pharynx or possibly cicatrical contractions."

Wesley Mills: "None unfavorable—often good results both on the general health and the voice, i.e.: when enlarged."

George L. Ross: "No, but would not say they do not occur, for of the many cases done yearly (150) I have rarely seen the case more than twice, oftener only once, about a week after operation. Have not had a case of secondary hemorrhage in

twenty years, but in every case I think of its possibilities."

J. MacIntyre: "The same remark applies to question number four that was made to answer question number three."

St. Clair Thomson: "None but changes for the better."

E. M. Holmes: "Yes."

E. W. Scripture: "Removal of enlarged tonsils improves the timbre of the voice."

John N. Mackenzie: "The voice is often improved after tonsillotomy and some of the great singers of the world have profited from it. I know of several cases in which the singing voice has been ruined after complete enucleation. In two cases, teachers of singing operated on by a skilful surgeon, the voices in same were destroyed and the life work of the patients was gone. The tonsils in connection with the other structures of the pharynx unquestionably have to do with the character—the timbre—of the voice. It is impossible to foretell exactly the amount and character of the changes in anatomical relations after the so-called 'complete' operation, no matter how skilful the surgeon may be or what new theoretical lines in surgery along which he works. It is therefore of urgent importance to proceed with great caution in those who make professional use of their voices; if I were a great singer I should never consent to a tonsillectomy except as a very last resort."

Massei: "Never."

Luc: "The singers generally stated an improvement of their vocal powers. I never came

across any who complained of any bad consequence."

Castex: "I have observed to my satisfaction the voice gains in facility and sonority."

Moure: "After the ablation of the tonsils a change of the voice is above all observed when the subject has already been accustomed to singing, and that in consequence, he has habituated himself to emit the voice with the two tonsils situated between the pillars. If the forms of certain hypertrophied tonsils embarrass the speaking (phonation) there is no doubt that there is then, after their removal, a very appreciable modification in the emission of the speaking voice among young persons."

Escat: "I have only observed a modification of the timbre and the volume of the voice, but rather for good than bad. Among professional singers the result obliges them to modify the vocal emission (to bear upon the sound) differently; an artist may be obliged to reconstruct somewhat his vocal education, and to modify his pharyngeal gymnastics; but he will do this rapidly and his voice will rather gain by the operation."

A. Barth: "Voice improves after removal of hypertrophic tonsils, but can also get worse, never the consequence of anatomical conditions."

Eugene Hodenpyl: "No."

Schmiegelow: "None, if the tonsils were not hypertrophied."

Frank E. Miller: "Yes. High range, more timbre, better resonance if by removal of abnormal tonsils sometimes through dry catarrh and irritating compensatory glandular or other ele-

ments of mucous membrane or swellings of glands extending down the sides of the palate."

Van Baggen: "The other case, where the tonsils were removed, was a singer. Here also the removal of the swollen tonsils appeared unavoidable because of the impossibility to correct a nervous contraction of the pillars of the fauces. As a result of the removal entire success followed. It did not affect the timbre of the voice; an increase of resonance was observed and she sang with far more ease and less fatigue."

Von Chiari: "If in older mammals (or infants) very large tonsils which have stretched the palatine arches very much, if they have been removed to the bottom of the sinus tonsillaris, then these arches lose their props (supports), and on account of relaxing of their muscles (the muscles of the arches) they cannot contract themselves thoroughly any more. Therefore, the resonance of the throat gets flabby walls, so that the strength and fulness of the tones suffer."

LETTER OF ESCAT.**Translation.**

Doctor Escat,
2, Rue Cantegril, 2,
Toulouse.

**REPLY OF DR. ESCAT, TOULOUSE,
TO TONSIL REFERENDUM.**

Answer to Question 1. I am of the opinion that the faucial tonsils have not for their only function that of phagocytosis studied by Metchnikoff, but also a *physiological and biological function due to an internal secretion*, like all the secretory internal glands (thymus, thyroid, liver, etc.).

Answer to Question 2. I am of the opinion, in accord with Allen, that the tonsils (palatine, pharyngeal, lingual, tubaire) secrete a principle, the nature of which it has been unable as yet to determine but which should be useful in the *development* and to the *growth* of the subject, and *probably to the growth of the skeleton*. I have found a reason for this in the fact that the normal tonsils atrophy normally about the age of eighteen to twenty years, *from the time that the subject has become fully an adult*. This normal atrophy is manifest and striking for the pharyngeal, tubaire and lingual tonsils; it is more defaced and more dissimulated in the faucial tonsils by reason of their globate form; this is why, in spite of the atrophy, there always persists a small nut or nucleus, but this atrophied tonsil is nothing

but a stump of a tonsil; when that atrophied tonsil has conserved in the adult, a certain "*groe neur*" (grandeur), it is because it is sick; it is because the chronic inflammation has counteracted the physiologic atrophic involution.

Answer to Question 3. I have observed nothing but good effects—amelioration of the general condition, exaggeration of the development in the child. I attribute the good result as much to the *cessation* of physiologic troubles resulting from the vicious internal tonsillary secretion from the chronic inflammation, as to the cessation of the mechanical interference brought on by the hypertrophy—no *cachexia tonsillipriva* has been observed because, even in the most radical ablation of the tonsils, there is always left a little adenoid tissue.

Answer to Question 4. I have only observed a modification of the *timbre* and the *volume* of the voice—but rather for good than bad. Among professional singers the result obliges them to modify the vocal emission ("to bear upon the sound") differently: an artist may be obliged to reconstruct somewhat his vocal education, and to modify his pharyngeal gymnastics; but he will do this rapidly, and his voice will rather gain by the operation.

Answer to Question 5. I am not a partisan of systematic ablation; I am not a partisan except of the ablation of *hypertrophied tonsils* or those suffering from *chronic inflammations* causing repeated tonsillitis, or peritonsillitis, etc., etc.

I am of the opinion that we need not seek to leave tonsillitic tissue (for one always leaves

some in spite of himself) sufficient that (with children) the function of internal secretion of the tonsils continues to be assured.

But on the other part, it is not necessary, in my opinion, to set one's heart upon completely extracting all the tonsillar tissue, as various American confreres proposed.

The tonsil is not an epithelioma! Further, a radical enucleation is very difficult with certain subjects, by reason of the almost constant existence of an *intra-velique portion* of the tonsil, which it is necessary to dissect with the bistoury, in the thickness of the veil.

Thus, one such dissection will be very dangerous from the point of view of the possible hemorrhage (see on the subject of the intra-velique portion of the tonsil, in my "Technique O. R. L.," pages 83 and 84, second edition, Paris, Maloine publisher, lately published). Consult also my argument on the report of Hicguet and Broeckaert to the Belgian O. R. L. Society, June 12, 1910 (in "Presse O. R. L. Belge," Number 7, 1910).

Question Number Five.

Would you, as a rule, advise the removal of normal tonsils?

Answers:

Von Chiari: "No."

Von Schrötter: "No."

Van Baggen: "No."

Schmiegelow: "No."

Caster: "No."

Beverly Robinson: "No."

Charles H. Knight: "No."

Joseph W. Gleitsmann: "No."

E. B. Gleason: "No."

George B. Rice: "No."

E. M. Holmes: "No."

John N. Mackenzie: "No."

Eugene Hodenpyl: "No."

William G. MacCallum: "No."

A. Coolidge, Jr.: "No."

G. Hudson-Makuen: "No."

William E. Casselberry: "No."

Edwin Pynchon: "The tonsil which might appear 'normal' to one, might appear abnormal in some way to another with a greater experience in the study of the tonsil question. Generally we do not advise operation if there is no trouble *subjective or objective*. In fact, such patients do not call for treatment. Many years ago *Bosworth* said, 'The less tonsil the nearer normal,' and my experience causes me to agree with him. The fact that a tonsil has never become inflamed is no proof that it is not causing or may not cause

trouble. I frequently remove tonsils which have been passed upon by other specialists as being 'normal' because I saw a relationship which they did not see between the tonsils and other parts, as the nose, the ears, the pharynx, the larynx, the pulmonary and gastro-intestinal tracts, and the results we think as particularly, and differing in different cases, deafness, tinnitus, hoarseness (recurrent) catarrh, bronchitis, cough and indigestion, and therefore more or less impairment of the general health in one way or another."

J. MacIntyre: "Question five is rather a puzzle to me because it is hard to say under what circumstances one may be called to remove *normal* faucial tonsils."

St. Clair Thomson: "It is impossible to define what is a 'normal tonsil.' I should never remove a tonsil at any age, unless convinced that there are disorders of health or hindrances to development which are directly attributable to it."

Frank E. Miller: "Never, if as described in question number one."

H. Holbrook Curtis: "Not unless they gave trouble."

Wesley Mills: "No. Only in exceptional cases if at all."

George L. Ross: "No. Have always avoided doing so."

J. E. Newcomb: "If not impeding function by their size in adults and patient is not subject to sore throat, do not consider removal necessary. Would remove all enlargements in patients, say below sixteen years."

George B. Wood: "I certainly would not ad-

vise the removal of tonsils unless there is some reason for doing so."

Massei: "No—I advise removal only when (although not much enlarged) they are the cause of frequent sore throat or when with the pharyngeal tonsil they are concurrent to insufficient breathing."

Barth: "I do not remove normal or slightly hypertrophic tonsils (which do not cause pathological disturbances). If one wanted to do that one would have to perform in any normal man a number of prophylactic operations."

Lermoyez: "I consider that the normal tonsils are organs that *must be respected*. One should never remove the *human organs*; not more a normal tonsil than a healthy tooth or a healthy eye!"

Luc: "No. Unless patients are subject to frequent pharyngitis, and we may hope that the suppression of their tonsils will make the attacks less painful."

Moure: "I believe that in a general way, one should not remove the tonsils when they are not of excessive size, or are not inflamed; in a word, that they are not the 'point of departure' of local infection frequent or distant (caseous suppurative tonsillitis). They are organs as useful as the ganglions when these latter are not degenerated."

Lubet-Barbon: "I think there is never an indication to remove a normal organ, and for myself, I never remove tonsils responding to the type you call normal, like volume and like condition of the gland; without chronic inflammation, without crypts, without adherence to the pillars, and elsewhere. How will you examine the tonsils

if the patient does not complain of something in regard to them, and then why remove them or touch them any more than the 'corner' of the nose or the uvula. I add that there are very few normal tonsils, because of the multitude of inflammations of which that organ is the seat from years of infancy, and results of these inflammations—crypts, adhesions, hypertrophies."

Escat: "I am not a partisan of systematic ablation; I am not a partisan except of the ablation of *hypertrophied tonsils* or those suffering from *chronic* inflammation causing repeated tonsillitis, peritonsillitis, etc., etc. I am of the opinion that we need not seek to leave tonsillitic tissue (for one always leaves some in spite of himself) sufficient that (with children) the function of internal secretion of the tonsils continues to be assured. But on the other hand it is not necessary in my opinion, to set one's heart upon completely extracting all the tonsillar tissue as various *American* confreres proposed. The tonsil is not an epithelioma! Further, a radical enucleation is very difficult with certain subjects, by reason of the almost constant existence of an *intravélique portion* of the tonsil, which it is necessary to dissect with the bistoury, in the thickness of the veil. Thus, one such dissection will be very dangerous from the point of view of possible hemorrhage (see on the subject of the *intravélique portion* of the tonsil, in my 'Technique, O. R. L.', pages 83 and 84, second edition, Paris, Maloine, publisher. Consult also my argument on the report of *Hicguet* and *Broeckaert* to the *Belgian O. R. L. Society*, June 12, 1910, in '*Presse O. R. L. Belge*,' Number 7, 1910.)"

Question Number Six.

Remarks?

Answers:

Charles H. Knight: "I hope you may be able to throw some light on the ever new, old question of function. I anticipate you will find a fair degree of agreement on other points. Wish you success in your quest."

E. M. Holmes: "I do not wish to be understood as opposed to removing badly diseased tonsils, for I believe they may be the cause of much trouble."

George B. Rice: "After removal of the diseased faucial tonsil the relations of the resonant cavities is changed; therefore the voice of a trained singer does not at once respond in the same manner as previously. This difficulty in tone production is in my experience soon overcome by training and readjustment of method, conforming to the new conditions. After this has been accomplished the voice is I believe improved in quality, in carrying power, and in ease of use."

E. B. Gleason: "The answers above refer to tonsillectomies properly done; and not to cases in which portions of the anterior and posterior pillars or other muscular portions of the pharynx were inadvertently removed with the tonsil, nor to tonsillotomies."

Wesley Mills: "I think somewhat enlarged tonsils may have for a speaker or singer, i.e.: cause him the expenditure of greater energy to do his work well, even when they do not embarrass

as greatly enlarged tonsils do. In doubtful cases, I would remove them, especially in singers."

St. Clair Thomson: "I am afraid the enclosed answers to your inquiries are not very satisfactory. I have few facts to offer you."

Frank E. Miller: "The usual cause of the singer's node is tonsillitis, which causes a weakening of muscular action over the side affected, then a sense of no power, then a relaxation, of cord on side affected, then bulging of the cord, akinesis, then node with hyperplasia, etc. A clean enucleation of tonsil in such a case cures nodule and its consequences in reversion. But never remove capsule in a singer."

"Since your visit and report of several cases of death from hemorrhage from ablated tonsils, I have developed a system of aeroelectrotomy for diseased tonsils, by means of suction and washings. Am very sorry I cannot go further into the matter for you just now. Be sure, however, that I have not forgotten your skill, care and kindness, and wish to praise and thank you for your great effort in behalf of tonsillar hygiene."

Massei: "I have operated by tonsillotomy in 2881 cases; I have not taken note of cases in which I removed the faucial tonsils with punch and in several sittings. The modest answers I have given are in relation with the experience of these cases."

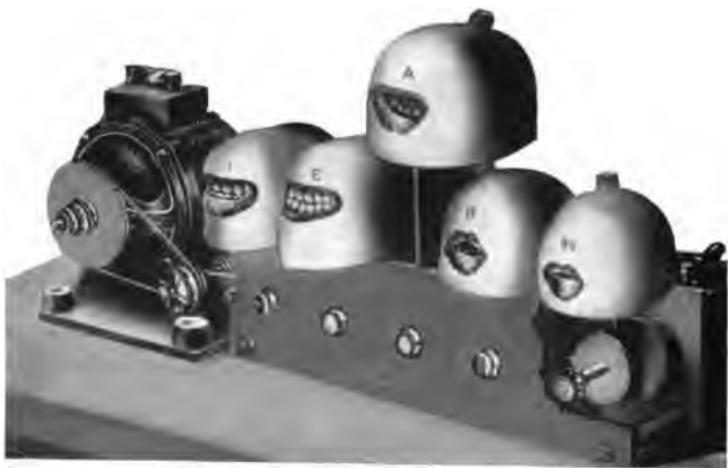
Schmiegelow: "I have never had serious attacks of bleeding after operation."

Luc: "I have adopted the practice of removing the tonsils ordinarily with the cold snare, after liberating them by means of curved scissors

and drawing them well out of their cavity by means of a special forceps passed through the loop."

Von Chiari: "You will find a new detailed summary of my remarks in the book called '*Die Krankheiten des Rachens von O. Chiari, Leipzig und Wien.*'"

Van Baggen: "As I am exclusively a specialist—expert for voice and speech afflictions, I considered the questions but from the phonetic point of view."



The vowel siren and buccal resonators.—*Marage*.

CHAPTER IX

THE SCIENCE OF THE VOCAL ART.

The science of voice mechanism, and the mastery of voice production, do not belong to the physician's art. Medical science reaches its limits at the science of the vocal art.

The study of voice mechanism presents many difficult problems. The mechanism is marvelously delicate, extremely complicated, with adjustments and re-adjustments easily deranged.

The finest art is the art of song. It is the divine art. To teach this art requires intelligence, aptitude, high ideals, and specialized education. *Teachers of this art must be trained to teach, and they must be credited with skill and experience in the attainment of artistic results.*

The voice profession may point with pride to the scientific contributions to the mechanism of speech, of such singing teachers as *Bennati, Garcia, John Howard, and Charles Lunn*; and to the perpetuation of the vocal art, by such masters as *Porpora, Tosi, Gabrielli, Trivilzi, the Lam-perti's, Mme. Cappiani, Mme Mott, Mme. Leh-mann, Shakespeare, De Reszke, Sebastiani, the Marchesi's*, and many others.

Marage, Scripture and other voice mechanicians of our day have made wonderful strides in acquiring scientific knowledge concerning the mechanism of speech and voice, and have thus contributed to the greater security in the preser-

vation of our inheritance of the art of song, as handed down by the great song masters.

The purpose of a vocal method is to produce a perfect co-ordination of all parts of the human voice-producing mechanism.

The Italians, like *Tosi*, *Porpora*, *Trivilzzi*, the *Lamperti's*, and *Mme. Cappiani*, were teachers of great practical experience and they understood how to adapt method to individual needs. Consciously or unconsciously, their method was physiological, and the fundamental principles of the physiology of voice production were there.

Salvatore Marchesi ("A Vademeum") says:

"*Manuel Garcia*, when trying to investigate the mechanism of the vocal organ, aimed exclusively at establishing a physiological system for the production and development of the voice in connection with the art of song, and proposed putting an end, if possible, to the dangerous interference of dabblers."

"On the contrary, the new scientific path he had opened to the cultivation of the human voice fell a prey to empiricism; thousands of undesirable meddlers seized upon the subject and brought about confusion."

"A conscientious laryngologist must indeed study and investigate the anatomical structure and physiological working of the human vocal apparatus, but he should remain on pathological ground. Laryngologists who publish books on 'Voice Production' betray their mission. The publication of their books complicated with scientific quotations and dilemmas, and consequently out of proportion to the general standard of in-

struction, *create unconsciously a number of physical disorders and diseases among singing people*, and thus contribute to the decline of the art of song."

"In view of the abuse that modern laryngologists, physiologists, and teachers have made of anatomical engravings, illustrating some scientific parts of their works, I wish to avoid any theoretical example of the sort."

"It would certainly be unjust to deny that modern physiological and acoustical investigation has furnished a broader basis for studying the phenomena of the human voice. But the material furnished by *new scientific discoveries must be subjected to severe criticism, and compared by the practical teachers with such real facts as are positively demonstrated by long experience, accredited traditions and approved results.*"

"We cannot and must not throw away all that constitutes the inheritance of the ages, all that has furnished evidence of practical value; but must use the new ideas *to complete and perfect the old ones.* The teacher may utilize all the precious discoveries made by modern science, but on condition that he understands them, and provided he knows *where, when and how* they are to be employed."

Mme. Lilli Lehmann ("How to Sing," 1909) says: "Singers should seek to acquire accurate knowledge of their own organs, as well as of their functions, that they may not let themselves be burnt, cut and cauterized by unscrupulous physicians. *Leave the larynx and all connected with it alone. I give warning of unprincipled*

physicians who daub around in the larynx, burn it, cut it, and make everything worse instead of better. I cannot comprehend why singers do not unite to brand such people publicly and put an end to their doings once for all."

Manuel Garcia, singing teacher, laid the foundation for the practice of scientific laryngology. Without his invention, the laryngoscope, there would be no laryngologists, and very incomplete knowledge of diseases of the larynx. The discovery of the laryngoscope is not all, however, that the world owes to the voice profession.

John Howard's classic work on the "*Physiology of Artistic Singing*," including his great exposé of the *physiology of artistic breathing*, are contributions of the highest value to the science of the vocal art.

And the scientific observations of Charles Lunn are important.

The elaborate scientific investigations of Scripture and Marage have revolutionized scientific thought regarding the mechanism of speech and voice. And they state that their great work is in its incipiency.

The genius of Garcia grows greater! Scripture and Marage have proved the truth of Garcia's SECOND great achievement, that of his discovery of the PUFF ACTION of the vocal cords.

But his second observation was fifty years ahead of his time; so far ahead that no one understood or accepted it. This second great discovery has waited over fifty years for Scripture, Marage and others to prove its truth, the truth

that Garcia persistently taught for over fifty years, as follows:

“What is sound?”

“Answer: “The sensation made in the ear by vibrating air.”

“How does the glottis produce sounds?”

“Answer: The two lips of the glottis, which are separated in the act of breathing, meet when preparing to produce a sound, and close the passage with the degree of energy demanded by the nature of the sound and the power with which it is to be emitted. *Then, being pushed upwards by the air, they give way and allow a portion of air to escape, but immediately return to their original contact, and recommence the action. These intermittent emissions or explosions of air, when regular and rapid enough, form a sound.*”

“Can you name any action which is an illustration of this?”

“Answer: The action of the lips of a horn player.”

“Are the sounds obtained always of the same character?”

“Answer: No. They may be bright and ringing or veiled.”

“How do you obtain these bright and veiled sounds?”

“Answer: If, after every explosion the glottis closes completely, each impinges sharply on the *tympanic membrane*, and the sound heard is bright and ringing. But if the glottis is imperfectly closed, and a slight escape of air unites the explosions, the impressions upon the tympanum are blunted, the sound being then veiled.”

"Has this observation any importance?"

"Answer: Coupled with the theory of *timbres* and that of the breath, it puts the singer in possession of all the 'tints' of the voice, and indeed initiates him into all the secrets of voice production."

"What produces pitch?"

"Answer: The number of explosions that occur in a given time."

"What causes intensity of sound?"

"Answer: Intensity of sound is not due to the amplitude of movement of the glottic lips, but to the quantity of air which makes one vivid explosion. The resistance offered by the lips to the pressure of the lungs determines this quantity. The amplitude is therefore a result, not a cause. After each explosion the glottis must be re-closed; for if the air found a constant issue, the greater the expenditure of air, the weaker the sound would be."

"How is volume of sound obtained?"

"Answer: The volume of sound depends on the expansion of the pharynx and of the vestibule of the larynx."

Garcia's theory was fully set forth in 1855 and published in the *Proceedings of the Royal Society of Great Britain*, Vol. 77, 1856. He has ever since reiterated his views.

The vocal cords do not throw off vibrations of sound, like a snapped cord or the string of a violin, *but* it is well illustrated by *Professor George M. Sleeth*, who states that:

"As the column of air coming from the lungs meets the resistance of the closed glottis, it is forced against the vocal cords, which by their re-

sistant flexibility chop or clip it into a series of instantaneous and continuous puffs or explosions of compressed air, which shock the surrounding air, and the reports are heard as continuous tone."

The puff theory of Garcia has been accepted by Hermann, Scripture and Marage.

Scripture, in "Researches in Experimental Phonetics," says:

"The two essentials of the theory, as stated by Willis and Hermann, namely: 'That the glottis emits puffs of greater or less sharpness, and that the vocal tones are generally inharmonic to the glottal tone, can be considered as definitely established. The reason for the puff character of the glottal action has been found by Professor Ewald (Strassburg) in the fact that the glottal lips are masses of muscle which yield by compression and do not vibrate like membranes. These facts have remained largely unknown, and we still find in the text-books the totally false theory that the vowels are produced by membrane-like vibrations in the larynx."

"I have adopted the puff theory and have taken into consideration some further elements also, namely: friction in the vocal cavities and associative formation of the vowel at the glottis."

"According to the puff theory, the glottis emits a series of more or less sharp puffs; each puff, striking a vocal cavity, produces a vibration whose period is that of the cavity; a single wave group shows the sum of these vibrations from all the cavities. The glottal lip bears no resemblance to a membrane or string. These puffs act on the vocal cavity, that is, on a complicated sys-

tem of cavities (trachea, larynx, pharynx, mouth, nose) with variable shapes, sizes and openings."

"The entire intellectual and emotional impression conveyed by the voice from the speaker to the hearer is contained in the speech vibration and registered in the speech curve. Hardly any problem of greater interest could be proposed than that of discovering the manner of getting from a voice curve the data concerning the action of the vocal organs in such an exact and minute form that conclusions can be drawn concerning the variations in the voice as depending on every emotion, on every condition of health, on every step in voice culture, on every difference in vowels and consonants, on each change in dialect, etc. The problem, however, is too vast for solution in a short time."

"The experimental analysis of the action of the vocal organs in speech is already well developed and forms almost a science by itself. A first attempt at something different, namely: an experimental analysis of the sounds heard by the ear, will here be described."

"An element of speech may be '*physically*' defined by the properties of the vibrations transmitted through the air. It may be '*physiologically*' defined by a description of the action of the vocal organs producing it, or of the ear receiving it. Or, finally, it may be '*psychologically*' defined by a description of the hearer's or speaker's perception of the sound as heard or spoken."

"A vowel analysis may be physical, physiological or psychological."

"*Krause* reports the case of a tenor whose glottal lips looked like two ridges of red flesh and whose tones appeared nevertheless unusually sweet and soft. *Imhofer* observed a singer with hypertrophy of one of the ventricular bands so that the glottal lip appeared as only a small edge beneath the heavy mass of the ventricular band resting upon it; with this apparently unavailable organ he is a successful tenor on one of the largest *German* stages."

"Both these cases can be understood on the puff theory, according to which the glottal lips in most cases come together at each vibration and open only to emit the puff of air."

"According to the puff theory of *Willis* and *Hermann*, the glottis emits a series of more or less sharp puffs; each puff, striking a vocal cavity, produces a vibration whose period is that of the cavity; a single wave-group shows the sum of these vibrations from all the cavities; the periods of these vibrations may stand in any relation to the interval at which the puffs come; that is, to the fundamental."

"This theory is certainly correct in asserting that the glottal tone (the fundamental) consists of a series of more or less sharp puffs. The puff action of the vocal lips has, moreover, been directly observed for male bass voices by the laryngostroboscope."

"The pitch of a cavity tone is to a great extent independent of the interval of the puffs. A sharp puff acting on a cavity will arouse a vibration whose period is that natural to the cavity."

"Each glottal lip consists mainly of a mass of

muscle supported at the ends and along the lateral side. It bears no resemblance to a membrane or string. The two lips come together at their front ends, but diverge at the rear. The rear ends are attached to the arytenoid cartilages. When the ends are brought together by rotation of these cartilages, the medial surfaces touch. At the same time they are stretched by the action of the cricothyroid muscles, which pull apart the points of support at the ends."

"In this way the two masses of muscle close the air passage. To produce a vowel such a relation of air-pressure and glottal tension is arranged that the air from the trachea bursts the muscles apart for a moment, after which they close again; the release of the puff of air reduces the pressure in the trachea and they remain closed until the pressure is again sufficient to burst them apart. With appropriate adjustments of the laryngeal muscles and air pressure, this is kept up indefinitely, and a series of puffs from the larynx is produced. The glottal lips open partly by yielding sidewise—that is, they are compressed—and partly by being shoved upward and outward. The form of puff—sharp or smooth—is determined by the way in which the glottal lips yield; the mode of yielding depends on the way in which the separate fibers of the muscles are contracted. When contracted along the medial edge, the action may approach that of a stretched string loaded with a soft mass along its middle portion or along its entire length. When contracted more laterally, the action may approach that of a soft mass flapping in a current of air,

or of two soft cushions striking together. These two forms of contraction correspond to separate action of the M. vocalis and the M. thyreoarytenoides (externus). When the slant fibers which insert along the medial edge of the glottal lips are contracted, there will be nodal points similar to those of stretched strings."

"These differences produce differences in the forms of the puffs. We can thus explain the forms of puffs in the different types of vowels by differences in the action of the muscles of the glottal lips."

"Physically stated, a vowel consists of a series of explosive puffs of air from the glottis acting on a complicated cavity with considerable friction. The puff's of air may be very brief and may be separated by comparatively long intervals of rest, or they may be of smoother form, even resembling a tuning-fork vibration. The period from one puff to the next determines the pitch of the voice; the form of the puff determines the musical timbre."

"These puff's act on the vocal cavity; that is, on a complicated system of cavities (trachea, larynx, pharynx, mouth, nose) with variable shapes, sizes and openings. The effect of the puff on each element of the vocal cavity is double; first, to arouse in it a vibration with a period depending on the cavity; second, to force on it a vibration of the same period as that of the set of puffs. The prevalence of one of the factors over the other depends on the form of the puff, the walls of the cavities, etc. Some vowels include the puff element as an important component,

others consist almost entirely of the cavity vibrations."

"The vowel curve, according to this theory, contains the record of the glottal puffs and of the set of cavity tones aroused by it. In a single wave there is not only a record of one glottal puff and of the cavity tones for one vibration, but also of what is left over from the fading vibrations of the preceding wave."

"In speech the pitch of the glottal tone changes continually. As the pitch of the tone from the glottis rises, the group of cavity vibrations come closer and finally overlap. This produces very complicated forms, but when the period of the puff becomes an even multiple of that of the cavity, the waves sum up in like phases and strong, smooth vibrations result."

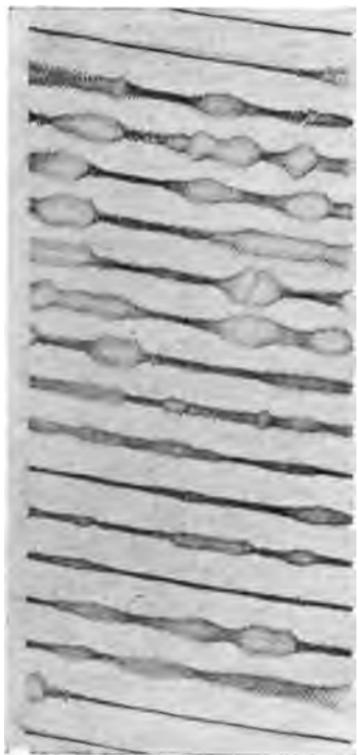
"For the ear the succession of puffs produces the tone of the voice; that is, the pitch of the sound heard depends on the interval at which the puff comes. The form of the wave impresses the ear with the effect of timbre, that is, with its character as more or less musical and also with its vowel character."

"A frictional analysis is required by the only theory of vocal action which we can accept. The simple harmonic analysis can lead only to false conclusions."

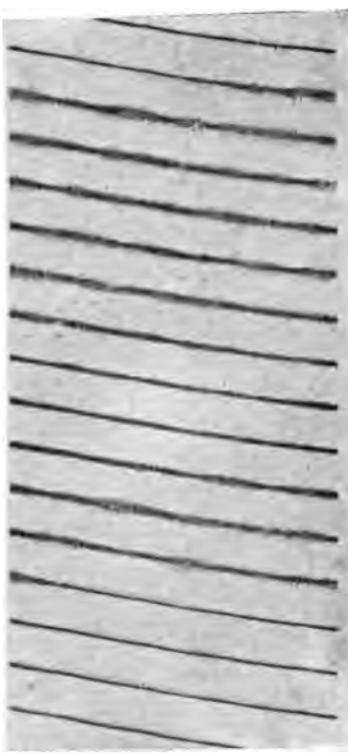
"In speech vibrations the friction cannot be neglected. For small movements, the friction may be considered as proportional to the velocity and opposed to the movement."

"It is evident that the complete analysis of a vowel wave is not a light undertaking. We can-





No. 1



No. 2

Photographs of the voice in singing the same exercise.—*Marage.*

1. French method. 2. Italian method.

Both numbers represent the same exercise well sung, and indicate that in this case, the Italian method has produced the more agreeable impression on the ear.

not escape from it, if the work is to have scientific value. A single trustworthy analysis is an achievement. When many such analyses have been accumulated, we can hope for correct views of the physical and physiological nature of the vowels and reliable data concerning the vowels of a language; we can ultimately expect in this way to have accurate knowledge with which to replace the vagueness and error prevalent at the present day."

Marage. ("*Etude des Vibrations de la Voix.*") *Vibrations of the Voice.*

"As to the special timbre of each voice, it depends probably upon the size of the opening of the glottis, on the tension of the vocal cords, on their size, on the volume of the ventricles of Morgagni, on the position of the teeth, quantities essentially variable not only with each individual, but also with the actual state of the mucosae."

"The vowels are due to an intermittent aerolaryngeal vibration, reinforced by the buccal cavity and producing ou, o, a, e, i, when these are put in unison with the sum of the vibrations, transformed by them, and giving birth to other vowels when that unison no longer exists: the number of the intermittances gives the fundamental note on which the vowel is emitted."

"*If the buccal cavity alone operates, we have the whispered vowel.*"

"*If the larynx operates alone, we have the sung vowel.*"

"*If both operate at the same time we have the spoken vowel.*"

Marage. ("Les Voyelles Laryngiennes," 1909.) *The laryngian vowels.*

"The vowel is an intermittent aero-laryngian vibration. The buccal cavity only serves to reinforce or to transform it (Report made November, 1908), and as there are not two mouths exactly the same, we obtain for the same vowel, as many traces as there are different singers, if we inscribe all the vibrations giving the special timbre of each voice."

"It now remains to determine experimentally the place in the larynx where that intermittent vibration is produced."

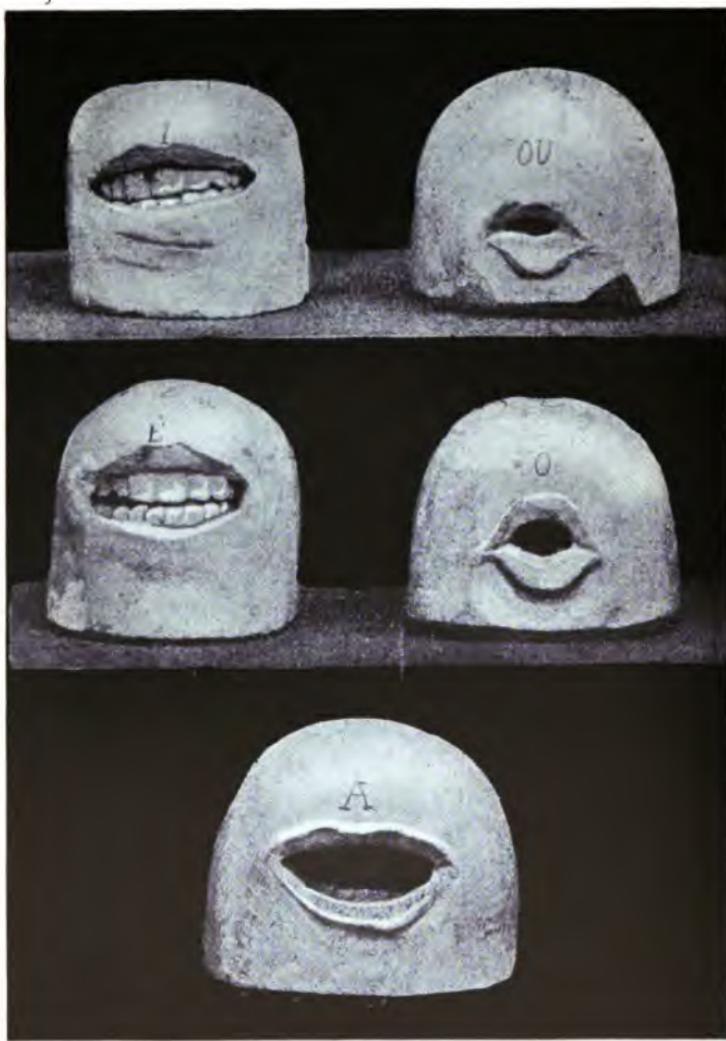
Marage. ("Différents Traces d'Une Même Voyelle Chantée.") *Different Traces of the Same Vowel as Sung.*

"The fundamental vowels, ou, o, a, e, i, are formed in the larynx. These laryngeal vowels are either reinforced or transformed by the buccal cavity."

"In that which is about to be said, no account is taken of the accessory harmonics which give the special timbre to each voice."

"Then, to each laryngeal vowel well emitted, corresponds one form, and one only, of the buccal cavity, for a determined subject. If that condition does not exist, the vowel is badly emitted; that is to say, transformed, and the characteristic curve no longer exists."

"We can comprehend why it is so rare to encounter singers having a good diction (fine pronunciation); a beautiful voice depends solely on the larynx and the ear; that is to say, on anatomic conditions; a good diction necessitates a series of



Molds of the buccal cavity pronouncing the vowels.—*Marage*.

long and difficult studies, which few singers have the courage to make completely."

Marage. ("Etude des Vibrations Laryngiennes," November 22, 1909.) *Study of the Laryngian Vibrations.*

"I have studied, until now, by the processes of biological physics, the vibrations of speech; analytical and synthetical experiments have led me to admit that the voice is an intermittent aerolaryngian vibration reinforced or transformed by the supra-laryngian resonators, and in particular by the mouth; but it is necessary to directly prove that the larynx alone is capable of producing these vibrations."

"I have been able, with the living subject, to completely annul the role of the buccal cavity, by filling it with stents, the substance which dentists use for taking impressions; an unbending cylindrical tube traverses the stents and conducts the vibrations to the exterior; there is then no longer any buccal vocalable, since there is no longer any resonator; however, the larynx produces perfectly the five vowels, ou, o, a, e, i; these are then laryngeal vowels; furthermore, their traces are characteristic."

"It is necessary to push the experiment further, completely isolate a larynx and cause it to render sounds analogous to those which it produces during life. This is why I have again taken up these experiments on the larynx of dogs."

"Technic.—Three hours after having been injected with morphine, the animal is put to sleep with chloroform and during the sleep, the larynx

is removed with the hyoid bone and the five or six rings of the trachea; a tube of caoutchouc of the same diameter as the trachea is fitted to it by a tube of thin glass, in such a manner as to permit a current of air to pass, the pressure of which is measured with metallic manometer extra sensitive, graduated in millimeters of water. This air can be taken from a reservoir of about 37 degrees."

"The laryngeal muscles are submitted to an induction current produced by a small *'bobine à chariot'*; the primary current is produced by one accumulator only. The larynx is photographed with magnesium on plates sensitive to red, and the vibrations are inscribed on a phonograph."

"Results.—(1) If the larynx has been removed during the chloroform sleep, the muscles can contract during three to ten minutes at the most."

"(2) To produce the vibrations, the current of air must have a varying pressure, as in man during phonation, between 150 and 200 millimeters of water."

"(3) If the excitor is placed on a level with the crico-arytenoid posterior muscles, the glottis opens wide, the vocal cords separate to the maximum and there is no sound."

"(4) If the excitor is placed at the level of the ary-arytenoids, the arytenoids approach each other and we obtain a fine low note recalling to such an extent as to be easily mistaken for the barking of a dog on a continuous note of the octave 1."

"(5) If the excitor is disposed in such a manner as not only to contract the ary-arytenoids, but

also the thyro-arytenoids (vocal cords), we obtain a note very pure and very high, belonging to octave 5; it is a kind of whistle on u, corresponding to the howling of dogs, who at night, bay the moon."

"This note, very high and sharp, has been obtained from a dog of medium height; in the photograph we see that the arytenoids have almost ridden one over the other, the glottis has become very slender and very short."

"(6) The height of the note does not seem to depend either on the current, nor on the pressure of the air, but solely from the position of the excitor; that is to say, of the muscles which contract."

"(7) In any case, the laws of the vibrations of cords have not appeared to me to be applicable to vibrations of the vocal cords; these latter have no sound by themselves; it is the air which vibrates."

"Conclusions.—(1) In taking the precautions which I have indicated, these experiments are very easy to repeat."

"(2) The photographs show that, at each note, the entire larynx, including the epiglottis, changes in form."

"(3) To each note corresponds a special form of the entire organ, and the larynx is an instrument of music which changes its form at each note."

"(4) If to this is added the influence of the supra-laryngial resonators, we comprehend the diversity of the tracings which are obtained for the same vowel. If the apparatus inscribed every-

thing, it is safe to say that there are no two tracings alike, for there are no two sounds absolutely the same."

"(5) The vocal cords do not act at all like membranous reeds in caoutchouc, and there is not any resemblance between the sounds rendered by reeds in caoutchouc and the sounds rendered by the isolated larynx."

"(6) Do these vibrations produce themselves at the level of the glottis; that is to say, at the moment when the air passes between the vocal cords, or have the ventricles of *Morgagni*, as *Savart* supposes, a preponderating influence? It is a question which, for the moment, it is impossible to determine."

"(7) We comprehend that the voice may suddenly disappear without apparent lesions of the vocal cords, for all the adductor muscles and all the articulations of the laryngeal cartilages are subject to rheumatic lesions, which may occur in a very short time."

John Howard ("Physiology of Artistic Singing." 1886) says: "The vocal cords are, in the main, two shelves of flesh more tender than the flesh of the softest fingers, and more easily squeezed or pressed into different shapes. They are about as soft as the flesh on the inside of the cheeks."

"The usual pictures of the vocal organs are misleading."

"The false cords are also small fleshy masses, similar to the vocal shelves (true cords) below in material, *and quite as capable of producing*

sounds of definite pitch as the fleshy parts of the fingers or the true vocal shelves (true cords)."

Liskovius in 1814, in his experiments upon the dead larynx *did make them produce a succession of musical sounds* by bringing them together with pincers and blowing between them.

Alexander Graham Bell ("Mechanism of Speech, Third Edition, 1908") says:

"Every change in the shape of the passage way, through which the voice is passed, occasions a corresponding change in the quality of the voice."

"The ventricles also, the spaces between the true and false vocal cords on either side, should, theoretically, exert an influence on the quality of the voice, for they constitute two small resonance chambers, situated close to the source of sound."

John Howard ("Physiology of Artistic Singing") says:

"The truth is, that very powerful contractions must be made to support even a soft and mild tone of artistic quality."

"Likewise, the true delivery, though it excites no sensation of palatal effort, so firmly tenses the palate that it must be pushed very strongly before it will give way. These and many other tests establish the indubitable fact that all powerful tones are the result of powerful muscular effort."

"The surest test of feeble throat action is pressure of the finger against the sternohyoid muscle just above the breast bone. If the finger detects no apparent swelling (virtual straighten-

ing) very little extrinsic effort, either right or wrong, is being made."

"The writer has yet to learn a single fact valuable in artistic singing which has been revealed by the laryngoscope."

"To the anatomist or physiologist, the surgeon or even the general practitioner, no smallest part of the whole throat can seem unimportant."

"To quote the words of *Baron Cuvier*, in introducing Bennati's '*Recherches sur le mecanisme de la voix humaine*', to the *Royal Academy of Sciences*, that not only the muscles of the larynx serve to modulate the voice, but also those of the hyoid bone, those of the tongue and those of the veil of the palate, without which one could not attain the degree of modulation necessary for singing."

"That the upper part of the voice channel has great influence upon the nature of the tone and principally upon the formation of the mouth-tone is proved."

"Furthermore, the greater size of the tongue is noted when the voice is especially full and resonant. The renowned Catalini, Lablache and Santini furnished examples."

"Bennati found that the soft palate was less decidedly lowered for high notes; but the positive contraction of the palate-larynx muscles (palato-laryngei) is shown by the narrowed forms of the palatine arches."

"The inferior constrictor, between the cricoid cartilage and the spine, forms the main boundary of the lower end of the purse-like pharynx. Whatever is swallowed must come into direct con-

tact with this muscle, and in this fact is found the reason why different habits affect the voice so differently and seriously. Many sing better after eating, because the descending food and drink have cleared away all thickened mucus or redundant moisture. More commonly the excessive flow of the secretions impairs the tone by making the layer between larynx and spine too thick to check the backward cricoid movement as fully as before, and too thick, also, to communicate the laryngeal vibration to the spine."

"Spirituous liquors inflame all mucous membranes and their influence upon tone is unmistakable. Malt liquors appear to be most harmful."

Escat. (*Maladies of the Pharynx.*) *Role of the Pharynx in Phonation and Articulation.*

"The veil of the palate by its movements of rising and lowering contribute in a large part to the formation of certain vowels and consonants."

"(1) The paralysis of the veil of the palate produces a phonetic trouble; *rhinolalie ouverte*, or, true nasality of tone, characterized by its exaggeration of the nasal resonance;"

"(2) The immobilization of the veil, provoked by the enormous hypertrophy of the palatine (faucial) tonsils, or, by a tonsillitis phlegmon, prevents the emission of the gutturals, g, r, hard g, r; that is to say, the tonsillitic voice;"

"(3) The obstruction of the nasopharynx diminishes and suppresses even the nasal resonance, creating a third phonetic trouble, the *rhinolalie fermée*, or *stomatolalie*, characterized by the impossibility of emitting the nasal an, en, on; this last trouble is above all charged to adenoid

growths and tumors of the nasopharynx; finally the pharynx in its entirety plays in the emission of the singing voice, the role of a powerful resonating box, and thus all the lesions of that organ bring with singers, various troubles of which the principal are the alterations of the timbre and the diminution of the volume of the voice."

Frank E. Miller says: "It is especially the structural differences between the resonant cavities of individual singers that determine differences of timbre or quality. There are innumerable timbres for the human voice, as many as there are voices, and all due to the pliability of the vocal tract. The walls of the pharynx are permeated by a network of muscles, susceptible of numerous adjustments and re-adjustments in size and shape. So numerous are the adjustments in shape of the voice tract that *Maria could make one hundred changes in pitch between any two notes in her voice*, and as she had a compass of twenty-one notes, she could produce no less than *twenty-one hundred changes in pitch within a range of twenty-one notes*. It is by timbre that we distinguish voices as we distinguish features."

"There are not such minute and individual differences between instruments of the same kind as there are between voices of the same range, because there are no such minute and individual structural differences in instruments as in the vocal organs of individuals—differences that each individual can multiply *ad infinitum* by the subtle and delicate play of muscles acting in response to mental suggestion, art sense, inspiration, tem-

perament, psychic impulse or whatever cognate term one may choose to call it."

G. Hudson-Makuen, in *The Transactions of the American Laryngological Association*, 1911 states: "*There is no absolute standard of vocal excellence.* The voice that sounds good to one person may sound different to another. *Whether a voice is good or bad depends*, not actually but practically, *upon the ear of the listener.* This fact may account, perhaps, for the great difference of opinion now prevailing as to the effect of tonsil operations upon the voice."

Are these statements the truth? *Is it a fact* that "A good or bad voice depends upon the ear of the listener?" and that "the great difference of opinion as to the effect of tonsil operations on the voice depends upon the differences in ears?" Or is the alleged fact only an assumption?

Is it the *mere faculty of hearing*, the *simple ear*, that enables one to judge the quality of tone; that justifies the price put upon the patrons of grand opera; that moves the audience to rapturous applause of famous singers; or, is it not rather the *educated ear* that reigns as an umpire in the art of song; is it not the *cultured critic* alone, who is capable of perceiving, analyzing and appreciating the very rudiments of a standard tone?

Is there no standard in vocal excellence, no criterion, no aim?

There is no doubt that the old Italian singing masters aimed for a standard tone, and taught strictly according to correct physiological principles. The old teachers insisted on a course of voice training which took years to give the stu-

dent complete ease and perfect control of technique.

The voice mechanism is delicate and finely poised. Slight physical disturbance, or wrong use of the mechanism, promptly and seriously affects the quality of the voice. Artistic singing depends upon a correct method in voice production. A correct method consists of a perfect co-ordination of all parts of the voice-producing mechanism, an intricate and complicated apparatus.

Frank E. Miller says that "in every voice certain notes are better than others, and a correct method of voice production, while it may not be able to make every note in the range of the voice of equal quality, *brings the whole voice up to a more even STANDARD OF EXCELLENCE*. It leaves the best notes as good as ever and brings the notes which naturally are not so satisfactory *nearer the STANDARD OF THE BEST*. There are certain *fundamental principles* in a correct method of voice production, based upon study and knowledge of the organs concerned."

"Every vocal tone is, in fact, a mental concept reproduced as voice by the physical organs of voice production. *That is why an inaccurate ear for pitch results in a vocalist singing off pitch.*"

"In 1891 I stated the necessity for a standard for tone, and had the idea of constructing a voice measure. It was to consist of a combination of a phonograph, photograph, and a mechanical reproduction of registration of the vocal sounds, the combination so arranged as to form a standard for vocal tones to measure and compare for all time every voice in the world."

"A standard pitch for orchestras was found to be absolutely necessary, in order that every combination of musical instruments might render music intelligently, and with greater harmony and without discord. The standard should be as nearly perfect as possible."

"It is of equal or greater importance that a standard vocal tone should be recognized, and a system formulated which will enable singers to acquire it. Recognizing that the vocal tone of Caruso and Melba each represent in the male and female voice the highest and best example of tone, and approach perfection nearer than any others, definitely to ascertain and fix the method of producing these tones, making it possible for students and singers to adopt these methods and produce tones of precisely the same character, is a prime desideratum. The waves of sound upon a disc or cylinder as they come from the throats of Caruso or Melba, furnish an exact template or model for waves that should be made by the vocal utterances of the pupil in order to produce *this perfect tone*. The waves of sound as taken by a record from a student will at once disclose marked variations from these *pattern records*, and with the knowledge of the point at which these variations occur, opportunity is had for modification or enlargement at these special localities. When this is done, further records will show a nearer approach to the pattern, and by successive corrections, the pupil should be able to produce sound waves as nearly identical with those of Caruso and Melba as is possible."

"Phenomenal voices always have been rare, and

doubtless are no rarer now than at any other period. At any time any opera house would have been proud of two such tenors as *Caruso* and *Bonci*, and of two such sopranos as *Melba* and *Tetrazzini*, while there is no period in which a *Sembrich* would not have been a *rara avis*."

"What is tone production? The very name implies that it is sound produced by a mechanism of some kind. Therefore, the first thing to be gathered from this deduction is that if the mechanism is correctly operated, of course, a correct result will be obtained, or, in other words, the tone produced will be a normal one."

"From the inception of the vocal art, the world has had its Carusos and Melbas to establish THE STANDARD FOR TONE, but until recently, the physiological process of producing this tone has been unknown."

"Now, as tone is the foundation of all singing, and as this tone is the thing of all others for which our artists have ever been criticised, does it not seem reasonable that there should be *and is a tangible as well as scientific means of voice building, whereby all these difficulties can be overcome*, and the beauty of each voice developed to its highest possible degree?"

"The time is rapidly coming, if not already here, when not only singers and musical people, but the general public, will see the truth of these statements. It is not enough for the teacher to be able to sing a correct tone; he must be able to show minutely in every stage of development from the beginning to the most advanced stages, the points of study to be taken up."

Scripture ("Researches in Experimental Phonetics," 1906) says: "The ear will hear what it expects to hear. The scientific man of to-day demands that work with the unaided senses be followed up by the methods of recording and measuring. Automatic records, experimental analysis and careful measurement must be the foundation of phonetics as a natural science."

A. Zund-Burguet ("Experimental Researches on the Timbre of the Nasal French Vowels") says: "Beyond the physiological method, researches into the timbre of the nasalized vowels could be made by the purely physical method. In fact, in place of judging the color of sounds according to the position of the phonator organs, we may, by the aid of certain methods, produce an inscription of the vowels, and devote ourselves thereafter to the analysis of the tracings thus obtained. The celebrated and regretted acoustician, *Rudolph Koenig*, had inaugurated, thirty years ago, the inscription, and following it, the decomposition of the vowels by means of manometric flames. *M. M. Hermann* and *Marichelle* have devoted themselves to the same researches according to the tracings of the phonograph."

"*Helmholtz* and others, notably the *Abbe Roussolot*, have extolled the study of the timbre of the vowels from tracings obtained by the application of the graphic method of *M. Marey*."

Marage ("Audition and Phonation," 1907): "The ear can hear three kinds of vibrations: noises, music and speech."

Marage ("Photographing Vibrations of the Voice"): "I have had an apparatus constructed

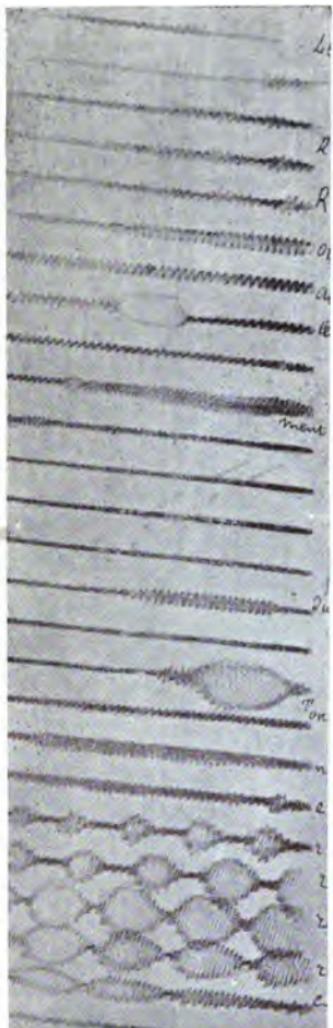
which permits of photographing, developing and fixing immediately, the vibrations of the voice."

"I think that this apparatus will be of service to professors of singing and of elocution in enabling them to not only permit their pupils to *hear*, but to *see*, the qualities and the defects of their voices, and to recognize their progress: philologists have with this instrument a method which permits them to easily inscribe exact tracings of the voice spoken or sung in different languages: finally, physicians have, with a photograph of the voice, an indisputable means of controlling and causing to be controlled the state of the larynx of their patients before and after a treatment."

Marage (Photographing the Voice in Medical Practice): "Photographing the laryngeal vibrations *permits us to see in a very clear manner*, the state of the voice at the beginning and at the end of a treatment."

The foregoing observations prove conclusively that the faucial tonsils are factors in voice mechanism; they show definitely the degree of perfection attained in the scientific notation by *sight and sound* of the action of the mechanism, and they exhibit the value of this registration in voice culture, as well as in the practice of medicine; they suggest the difficulties and show the great necessity of care in the diagnosis of tonsillar affections that bear upon the mechanism of the voice.

Robert and Sven Berglund, Stockholm, have invented a new apparatus, the *photographone*, which reproduces simultaneously both sound and action.



No. 1



No. 2

Photographs of the voice in singing and speaking.—*Marage.*

1. Speaking.

2. Singing.

Thomas A. Edison has invented a talking machine that operates in harmony and unison with motion pictures, called the *Kinetophone*.

Escat. "*Role of the Pharynx in Audition.*"

"The auditive function has for an essential condition the integrity of the naso-pharyngeal cavity, and the free functioning of the muscles of the veil and of the pharynx."

Marage. ("*Photographie des Vibrations de la Voix*") "Photographing the Vibrations of the Voice."

"(3) By photographing the vibrations of the voice, a professor of elocution can recognize from the foregoing:

"(a) The duration of each vowel."

"(b) The note on which it is emitted."

"(c) The constituent parts of each syllable."

"For foreigners and deaf mutes, we have thus a method of permitting them to *see* their defects."

"(4) A professor of singing can immediately cause a pupil to *see* a scale which he has just sung."

"(a) *If he has sung in time*, for each note must have the same duration and each rest, represented by a straight line, the same length."

"(b) *If he sings true*, for it suffices to count the number of vibrations per line and multiply it by n if each second line lasts $1/n$ of a second."

"(c) *If his voice is good*, for the vibrations must have a constant amplitude, and be regular, having no traces in spindles, which indicates that the voice trembles."

"(d) *If he has an insufficient vital capacity*,

for if the singer is obliged to breathe too often, we find the periods of rest too long and too frequent."

"(e) *If he has good diction* (declamation) : in fact, if his diction is bad, there is no proper grouping."

"(f) *If his diction is good*, each vowel should have its characteristic grouping and the consonants should be marked in the places which they should occupy."

"(g) *What the compass of the voice is*: we can recognize it in finding the lowest and the highest note that a singer can give."

"(h) *If he has 'holes' in his voice*: then the corresponding notes are short or trembling, or without diction or even nil."

"Conclusion.—I think then that this apparatus will be of service to professors of singing and of elocution in enabling them to not only permit their pupils to *hear*, but to *see*, the qualities and the defects of their voices, and to recognize their progress; philologists have with this instrument a method which permits them to easily inscribe exact tracings of the voice spoken or sung in different languages; finally, physicians have, with a photograph of the voice an indisputable means of controlling and causing to be controlled the state of the larynx of their patients before and after a treatment: in many cases this control will not be useless either to the physician or the patient."

Marage. (*La Photographie de la Voix dans la Pratique Médicale.*) *Photographing the Voice in Medical Practice.*

"If in the course of a treatment it is indis-



No. 1



No. 2

Photographs of the voice in medical practice.—*Marage.*

No. 1. The note "la" sung by a larynx affected with the singer's nodule, photographed at different periods of the treatment. No. 2. The same note photographed at the beginning and at the end of treatment for pharyngeal catarrh.

pensable to measure in a precise manner, the variations of the auditive acuity, it is also equally important, in the same conditions, to inscribe the notes which a diseased larynx can sing."

"In a work presented to the Academy of Sciences, March 23, 1908, I have described an apparatus which permits photographing the vibration of the voice on a strip of paper 25 meters in length."

"I have thought that this method might be useful to physicians in permitting them to recognize, and to allow their patients to recognize, the state of their voice before and after a treatment."

"I have had occasion to photograph a large number of voices."

"Conclusions. The photographing of the laryngeal vibrations permits us to see in a very clear manner, the state of the voice at the beginning and at the end of a treatment; this proceeding is a guide for the practitioner in the progress of the case to be given and in certain cases these tracings would not be useless to the patient and to the physician."

U.S. Consul-general, Edward D. Winslow, Stockholm, has courteously furnished me the names of *Robert and Sven Berglund (Stockholm)*, inventors of a new instrument called the *photographone*. This instrument reproduces simultaneously both action and sound. In this instrument, the human voice and all other sounds are perfectly reproduced without any disturbing secondary sounds. So perfect is the reproduction of sounds with the photographone that the inventor can distinguish between and actually read

on the curve the different letters of the alphabet, and the photographic plate is so sensitive that the smallest variations in the voice can be studied. The same words uttered in the same language, but by another individual, appear different in the photographone script.

The great importance of this method for obtaining linguistical and musical records is evident. With the photographone it is possible at one time to photograph the action as well as the music and song and to reproduce the same at one time. If the original music or song should not be strong enough to fill a large concert hall the sound can be increased as desired. An immense volume of magnified sound can be reproduced.

And it has been suggested that this apparatus will be of great value at sea in calling out the names of lighthouses. And I believe that it would also prove a valuable equipment in various ways for ocean steamships.

Marage. (Voix de Poitrine et Voix de Tête.) Chest Voice and Head Voice:

"A subject determined may emit a certain number of notes which constitute the tessiture of his voice; to the lower notes of that tessiture corresponds what is called the chest register; to high notes, the head register; between these two registers there exists a passage more or less marked; it is the mechanism of this passage that I wish studied to-day."

"(1) *Anatomical Fact.* All the intrinsic muscles of the larynx are innervated by the recurrent; the two crico-thyroidians are alone innervated by the external laryngeal; they have then

a special independence; these two muscles make the thyroid cartilage see-saw on the cricoid in bringing together the two cartilages forward; they are then the tensors of the vocal cords."

"(2) *Experimental Fact.* If, at the moment of passing from the chest voice to the head voice, there is a sudden contraction of the crico-thyroidian, the space comprised in front between these two cartilages must diminish in size, and we can then recognize that diminution by means of the cardiograph of Marey, modified by Zund-Burguet."

"This instrument is placed on each side of the neck in the space limited by the thyroid, the cricoid and the crico-thyroidian muscle; these two drums communicate with an inscriptor drum by means of a tube having a y-shape."

"*First case.*—There is a very marked difference between the two registers; there is then produced a sudden contraction of the two crico-thyroidian muscles."

"*Second case.*—The passing of the chest voice to the head voice is less marked, then the curve rises little by little, and with certain artists, it is almost continuous without a union. The crico-thyroidian muscle may then either suddenly contract, or contract little by little in such a manner as to produce the progressive tension of the vocal cords. If, at the same time, we photograph the vibrations of the voice, not only may we know the notes which belong to the chest register and to the head register, but further may determine the missing notes, that is to say, the holes in the voice.

"The professors have then well observed this

phenomenon of the transition due to the contraction of the crico-thyroidian muscle, but the names chest voice and head voice seem to be quite badly chosen, for they may lead their pupils into error: there is only in fact one voice to the aero-laryngian vibration produced at the level of the glottis; it would be better to employ the term low register and high register."

"The contraction of the crico-thyroidian muscle is perhaps not the only phenomenon which is produced at the moment of passage, but it is always produced and it is easy to put in evidence."

"Conclusions. When the passage between the two registers, low or high, is very marked, the tracing of the vibrations shows that the voice is tremulous and that certain notes are in default. The professors of singing have then reason for employing the methods which they believe to be useful to cause this passing or transition to disappear."

Marage. (La Respiration chez les Chanteurs.)
The Breathing of Singers:

"As Marey said a long time ago, there is no such thing as masculine respiration and feminine respiration; there are good respirations and bad respirations."

"(1) *Good Respiration.* In order that the respiratory act be well done, it is necessary that the thoracic cage be dilated nearly equally following all its dimensions. It is further necessary that the respiration be sufficient, that is to say that the vital capacity be in accord with the age and the height of the subject."

"(2) *Bad Respiration.* Bad respiration oc-

curs, when one of the perimeters, inferior, or superior, augments much more than the others."

"*Exaggerated augmentation of the inferior perimeter.* Occurs in men and women of a sedentary life; the muscles of the abdominal wall have no longer the tonicity sufficient; the diaphragm in contracting, repels the intestinal mass; these subjects breathe with the abdomen, according to the vulgar expression."

"*Exaggerated augmentation of the superior thoracic perimeter.* Occurs, chiefly, in certain subjects much given to sport and in women who wear corsets, even if not tight; the slightest obstacle suffices in effect to change the type of respiration. The muscles of the abdominal wall have no longer any work to perform since they are replaced by the corset, and allow themselves to be repelled too easily by the diaphragm when that obstacle has disappeared."

"*Conclusions.* (1) For a respiration to be good, it is necessary that the thoracic cage be dilated following all its dimensions."

"(2) In order that it be sufficient, it is necessary that it dilates enough and in such a manner, as to obtain a vital capacity in accord with the age, the height and the weight of the subject."

"(3) Each pupil of singing or elocution should have a respiratory card giving not only his height, his weight, his thoracic perimeter and his vital capacity, but also the curve representing his class of respiration."

"(4) It is useless to learn to sing or to speak if one does not know how to breathe, and the ma-

jority of voices are lost not so much through a bad general method as by bad respiration."

John Howard, Harry Campbell, Marage, and Koffler, are four great authorities on breathing and they all agree.

Marage. (La Portée de Certaines Voix et le Travail développée Pendant la Phonation.) The reach of certain voices and the energy developed during phonation:

"An orator is often embarrassed, when he speaks in a room of which he does not know the acoustic qualities, to know what energy he must give to his voice to make himself heard by all his auditors."

"The problem is quite complex; we have, in effect, three factors which may intervene: the room itself, the auditors and the orator."

"A room is good if there is no echo and if the resonant sound has a sufficient duration to reinforce the sound which produces it without encroaching upon the sound which follows."

"Further, the ears of the auditors are not equally sensitive to all the sounds: to the physiological state and in the open air, low tones are heard much less easily than high tones."

"We have then remaining, the influence of the orator."

"We say generally that certain voices carry better than others: is this assertion true; what exactly does it signify?"

"We are therefore going to seek, in a determined room, what energy must be given to his voice to make himself heard, an orator, accord-

ing to whether he has a register of basso, barytone or tenor."

"The energy of the sound being given by the product VH of the Volume V of air which escapes from the lungs under a pressure H , the question is to determine these two quantities."

"The numerous experiments on the measuring of the auditive acuity, have proved to me that the synthetic vowels ou, o, a, emitted on the same note, *fa*, for example, common to the registers of basso, barytone and tenor, produce the same impression on the ear as one of these three voices: it will be sufficient then for us to employ successively these three vowels."

"We will then seek the smallest amount of energy necessary to cause one of these sounds to be heard by a listener placed successively in different parts of the room."

"In the experiments made in rooms of the Trocadero, Chapel of the Sorbonne, Academy of Medicine, and Richelieu Amphitheatre, it is at once seen that in all these rooms bass voices have a great disadvantage, since they must employ an energy 7 to 16 times greater than a tenor voice: the barytone voices are intermediate, while approaching much closer the tenor voice."

"If we consider the different rooms, a tenor must expend four times more energy in the Trocadero than in the Richelieu Amphitheatre; on the contrary, a bass voice is obliged, according to the room, to give sometimes an energy nine times greater."

"Conclusions. Equality of Diction.

"(1) It is right to say that certain voices carry

better than others; this expression simply signifies that certain voices require less effort to make themselves heard."

"(2) An orator should develop V and H, that is to say, augment V in increasing his vital capacity by exercise appropriate for the inspirator muscles; augment H in learning to exercise his expirator muscles; and at the same time not allow the air to be uselessly lost by the opening of the glottis."

"(3) In practice, to make himself heard by an audience in an unknown room, it is necessary to augment little by little the energy of the voice until he commences to perceive himself the sound of the resonants; this diminishes a little the energy of the sound and will thus obtain the best results."

"Remarks. (1) The pressure of the air maintains itself whether it is an affair of the natural or of an artificial larynx between 100 and 200 millimeters."

"(2) That which causes the energy of phonation to vary enormously is the delivery of the air, which oscillates from 300 litres per hour (natural larynx, conversation) to 2,070 litres per hour (artificial larynx, conversation.)"

"(3) The vocal cords not having the same length in men (20 to 24 millimeters) as in women (16 to 18 millimeters), I have made experiments in changing the length of the vibrating part of the membranous reeds."

"For the long reeds (24 mm.) the minimum energy to make them vibrate is 57 kilogrammetres per hour; for the short reeds (18 mm.) 14

kgm., 400. One may then foresee that women fatigue themselves much less in talking than the men; we know also that children, in whom the larynx is still much smaller, can talk all day without having the air of being in the least tired."

"*Conclusions.* (1) An orator must, before all, learn to breathe, since it is V which varies the most."

"(2) He must not lose air uselessly; that is to say, the vocal cords must join on the median line."

"(3) Men, and in particular, basses, fatigue themselves much more in speaking than women and children."

"*Resumé.* During phonation, there escapes from the lungs a certain volume of air under a certain pressure; the product of these two quantities, the volume and the pressure, give the work developed."

"It is a question then to determine them."

"The volume of air which escapes is obtained quite easily, but it is more difficult to measure the pressure, for it is necessary to take it directly in the trachea."

"These difficulties have been surmounted in taking the measures on two subjects; one was furnished with an artificial larynx and the other wore a tracheal canula and a normal larynx. During ordinary conversation, there is developed, in one hour, an energy of about 48 kilogrammeters; that is to say, that to speak during one hour is not more fatiguing than to lift at each second a weight of 18 grammes, one meter high: a lady in trifling with her fan, or a professor ges-

ticulating with a piece of chalk, exerts an energy much greater."

"To pronounce a discourse in a large room, the energy is more considerable, but it is not enormous; it is, on an average of 200 kilogrammetres per hour; an employee of a railroad performs a greater work in lifting from the ground on to his shoulder, four packages of 50 kilogrammes."

"We have compared subsequently the energy developed in conversing by the voice of a man and that of a woman, and have found that women are fatigued, in talking, four times less than a man. We can then comprehend how children who have a larynx narrower than their mothers, can talk for several hours without taking a rest."

"The practical conclusions of these experiments is as follows: The energy developed depends, above all, on the volume of air expirated; an orator must then learn to accumulate the air in his lungs and to not allow it to escape uselessly."

In the science of the vocal art, there are many lights and side lights, of exceeding interest, which the bounds of this book must of necessity exclude: such, for example, as the consideration of what well-informed teachers of voice, artists, and students, should know of the anatomy and physiology of the vocal organs; the measure for increasing the volume of the voice, its power, intensity and endurance, the means for improving the purity of tone; consideration of variations in resonance, compass, timbre and quality, advanced views regarding pitch, and the sensations of audition; experiments in phonetics; the production of vowel

sounds by manikins; speech without a larynx, etc.

Charles A. Rice: "Vibration is tone production. Tone production is vibration. Vibration is the cause of sensation. Perception of pitch is occasioned by the sensation acting directly on audition by mediate contact, and not by listening with the outer ear. Perception of pitch is due to mediate contact with the nerve of hearing, or direct contact with the sounding board. Listening by the external ear is only confusion in tone production."

Marage (Audition et Phonation chez les Sourds-muets):

"The ear can hear three kinds of vibrations: *noises, music and speech*."

Marage (Théorie Élémentaire de l'Audition):

"The middle ear is filled with air which communicates with the atmosphere by a tube, the Eustachian tube, opening into the pharynx: the pressure is thus always equal on the two faces of the tympanum."

"The vibrations of the tympanum are traversed to the round window by the intermediary of the air, and to the oval window by the intermediary of the chain of ossicles."

"The internal ear is filled with a first liquid, the peri-lymph, which communicates with the cephalorrhachidian liquid by a canal, the peri lymphatic canal; a membranous sack, the endo-lymphatic sack, is completely immersed in the peri-lymph and filled by a second liquid, the endo-lymph liquid. It is in the midst of this liquid where are

found the nerve terminations of the auditory nerve; the volume of the endo-lymph is very nearly the third of that of the peri-lymph. We see then that the exterior vibrations, before impressing this nerve, must traverse the tympanum, the chain of ossicles, the peri-lymph, and the endo-lymph, and that everything is disposed in the ear, not to augment the intensity of the vibrations, but, on the contrary, to diminish them as much as possible."

"When, for any reason whatever, the chain of ossicles is immobilized, the chain of vibrations can pass directly from the tympanum to the round window by the intermediary of the air of the middle ear, and if the tympanum itself is too much thickened to vibrate, it suffices to pierce a hole in order that the vibrations may pass directly to the round window and that the sound be perceived."

How does a sound impress itself upon the nerve terminations? There are two theories: (1) By *Helmholtz*. Each nerve termination of the cochlea is influenced, and could not be influenced except by one sole sound of determined pitch; (2) by other authors. All the nerve threads will be equally impressed, and it will be the different nerve centers situated in the brain which will react differently."

"The results of 1,500 measurements of auditory acuity, the observation of 800 cases of deafness of different kinds, lead me to suppose that this second hypothesis must be admitted."

Marage, presented by *M. Yves Delage* (*Contribution à l'Etude de l'Audition*, October 12, 1908) :

“(1) *Anatomic Facts.* The internal ear is not composed only, as is taught in many classic works, of vestibule, of semi-circular canals, and of the cochlea with its nerve terminals, as found therein; in this term *internal ear* must be comprehended the *real* terminations in the brain, of the two branches, vestibular and cochlear, which constitute the auditory nerve; the vestibular nerve which corresponds to the anterior root, terminates in the nucleus of *Deiters* and in the vestibular nucleus; the posterior root, or cochlear nerve is much more complex, and joins, by divers branches, to eight different nuclei. *Bechterew* has divided these different branches into centripetal auditory ways of first and second order, which communicate, either among themselves, or directly with the cochlea, with the different centers; further, there exist centrifugal or recurrent ways which allow the different cellular nuclei to communicate among themselves.”

“(2) *Pathological Facts.* With the apparatus which I have presented here, one may now determine exactly the height, the timbre and the tensity of sounds, which the ear may hear.”

“Results obtained:

“(a) Subjects are frequently met with who hear the most feeble noises, but who are completely deaf as to music and speech.”

“(b) Others are met with who hear noises, music and speech, even to the musical vibrations produced by the timbre of each voice, but who do not comprehend it.”

“(c) There exist other subjects, in whom deafness has evolved rapidly, in such a manner as to

become absolute in 24 hours; in one instance, for example, deafness is evolved in the following fashion: the deafness began at 11 o'clock in the evening, by the disappearance from the hearing of certain instruments of the orchestra, the violins; 2 hours afterwards, no musical sound could be heard, but speech is very well comprehended; 8 hours after the deafness is complete for all vibrations, noises, music, speech."

"(d) When the auditory acuity is developed by appropriate means, the inverse phenomena are produced; all of the vibrations do not commence to be heard at the same time, and the amelioration is produced as if it concerned different ears which are not sensible to the same sound."

"Explanation: These phenomena may be explained in the following manner: when a vibration of any nature is produced at the exterior, all the nerve terminals are impressed by the intermediary of the peri-lymph and the endo-lymph, and, in case it concerns a noise, a musical or speech vibration, it is the nerve centers of the first, second, or third stage which are impressed."

"The degree of perfection of the hearing is then connected, not so much to the ear as an organ than to the auditory centers, and in consequence to the brain."

Resumé. The second theory of the auditory centers is conformable to our most recent anatomic and pathologic knowledge. Furthermore, it readily explains the phenomena which we observe."

Adolph Zund-Burguet (Contrôle et Connexion de l'Emission Vocale): "holds that the improper

pronunciation of words is due to the wrong position of the tongue at the moment of emission, and that by means of the instruments, which he has invented and herein describes, we may now, for the first time in the history of phonetics, observe and control the action of the tongue, and thus lead to a perfect emission and correct pronunciation of not only French, but of any other language." The article is highly interesting to phoneticians.

A. Zund-Burguet (Recherches Expérimentales sur le Timbre des Voyelles Nasales Françaises): "It remains for us to determine the timbre of the four nasal vowels according to the position of the lips. Here, still, I will be able to employ the graphic method: I have preferred to have recourse to photography."

"I have said previously that beyond the physiological method, researches into the timbre of the nasalized vowels could be made by the purely physical method. In fact, in place of judging the color of sounds according to the position of the phonator organs, we may, by the aid of certain methods, produce an inscription of the vowels, and devote ourselves thereafter to the analysis of the tracings thus obtained."

Adolph Zund-Burguet. (La Rééducation Auditive d'après la Méthode Electro-Vociphonique):

"We had no trouble in recognizing that the superiority of the oral method, over other methods of auditory re-education, resides principally in the physical nature of the sounds of the human voice. In the case of a correct emission, these are char-

acterized by a great richness in low harmonics, and the absence of all noise."

"To create an instrument capable of producing low, medium and high sounds, and possessing the characteristics of the sound of the human voice, was only to solve half of the problem presented. To solve it entirely, it was necessary to find a means of modifying at will their intensity, without changing at the same time their musical pitch, and also inversely, to be able to vary the pitch while conserving the intensity. The discovery of a new principle, led to the creation of an instrument until now unknown, and with it, the complete realization of our dream."

"This instrument we call the Electro-Vociphone. It contains three organs, producers of sounds very rich in harmonics, free from all noises, and so like the sound of the human voice that it is only necessary to pass the sounds through an appropriate resonator, to transform them at once into vowels."

Technic. After having determined in any usual way the auditive acuity of each ear to be re-educated, we sound the entire series of tones in passing from the low to the high, or inversely: at the same time insisting on the sounds that the ear perceives the least easily."

J. Helsmoortel (La Surdit  d'Origine Sclereuse et la R  ducation Auditive par le M thode vociphonique. Deafness of Sclerotic Origin and Auditive Reeducation by the Vociphonic Method):

"In 1903, in the course of the meeting of the Belgian Otological and Laryngological Society,

Professor *Eeman* of *Gand* declared that we know no means of acting on this process. The usual means remain without effect. Local mechanical means only aggravate the malady and precipitate its progress. *Dr. Lermoyez* subscribed without reserve to that declaration, and the greater part of the otologists present were of the same opinion. We held that opinion until the beginning of 1909, when happy circumstances permitted or obliged us, to modify totally our opinion. It will not be found extraordinary that we have changed our opinion on the intractability of sclerotic deafness."

"We have presented a number of cases of sclerotic deafness greatly ameliorated by re-education, at the meeting of the Society of Otology and Laryngology at Brussels, in 1909, and on two occasions to the Medical Society of the Louise-Marie Hospital, at Antwerp."

"The apparatus, invented by *M. Zund-Burguet*, called Vociphone, or Electrophone, contains the producing organs of sounds which correspond to the three human registers, low, medium and high. The timbre of the sounds is entirely similar to that of the human voice."

"By the sole aid of the electrophone or vociphone, it becomes extremely easy to fulfill all the conditions exacted and the recital of the clinical observations will permit you to judge of the efficiency of this new method, of auditive re-education in the case of progressive deafness of sclerotic origin; that is to say, in the precise cases where medico-chirurgical methods are absolutely powerless. The results obtained, to our surprise,

have not only been integrally maintained, but, in the majority of cases, have been considerably augmented during the period of repose."

A. Raoult. (*Rééducation de l'Ouie par le Procédé Electro-Phonoïde. Re-education of the Hearing by the Electro-phonoid Method.*)

He was at first extremely skeptical of the process, but has since tried it in some 50 cases with great success, and is now completely in favor of it.

After reciting cases, with details, he says:

"In conclusion, that which gives an entirely special value to the electro-phonoid process of re-education, is the persistence of the amelioration of the hearing even when the treatments are finished and the patients left in repose. *Helsmoortel* has related several observations of patients seen a year after the re-education, and in whom the amelioration had persisted."

"Summary: From the observations of all these facts, we may conclude:

"(1) Even in cases of advanced sclerosis in the aged, we may still hope to obtain amelioration."

"(2) The amelioration is much more noticeable in the young, and even more when the evolution of the oto-sclerosis is less remote."

"(3) The verification in patients of the abnormal paracousis of *Willis* or that of *Rinne* seems to make it our duty to prognosticate a notable amelioration of deafness."

"One great value of the highly important method of auditive re-education of *Zund-Burguet* and *Helsmoortel* will be that of enabling the voice

user, especially the singer, to again be able to perceive his proper vocal pitch."

Marcel Natier (Rééducation Méthodique de L'Oreille par des Exercices Acoustiques) states that he has had great success in the re-education of the ear by acoustic exercises with diapasons (large tuning forks).

Marcel Natier (Surdité et Altitude. Rééducation Méthodique de l'Oreille) : Details cases of deafness which were greatly helped by living in the mountains at a height of 625 to 900 yards. He simply records the success of altitude.

J. W. Gleitsmann (Ueber Pharynxstimme, 1909) :

"The first patient who could phonate after the extirpation of the larynx was presented to the Medical Society of Greifswald, 1888, and to the Medical Society of Berlin, 1893, by *Dr. Schmid*. *B. Fränkel* gave the correct explanation. One year and six months after removal of the larynx, the man could speak with a harsh, monotonous voice. The second case was that of *J. Solis-Cohen*, in April, 1892. He was presented to the Medical Society of Philadelphia in October, 1893. He could talk well and modulate his voice. Heard 40 feet away."

"Two cases reported by *Dr. Gottstein* (1909). First patient, *Gottstein* was going to provide with a pharyngeal voice. Was given exercises. Returned in four months, with a plain voice. After two other lessons, he could modulate his voice and even sing a song. What *Gottstein* accomplished with this man in about one year, he did with an-

other patient in six weeks. This second one spoke in a hoarse voice, but plain and distinct."

"The systematic perfection and scientific development of the method is due to *Gutzmann*."

"Such a voice can be acquired on two conditions: the first in an air chamber in the hypopharynx, generally, created by the free will of the patient, and *second*, a little narrow space above the air chamber, which must be such that the emission of air into the folds of the mucous membrane *may cause vibrations* which are able to produce a real tone. *Gutzmann* says that there cannot be a general rule about the place where the voice is formed; it depends entirely on the mechanical conditions created by the laryngectomy in every case respectively." And I will add to the statement of *Von Gutzmann*, NO VIBRATION, NO VOICE.

Von Gutzmann, in his work, "*Stimme und Sprache ohne Kehlkopf*," makes the remarkable statement that "if he can teach those who have no larynx to talk and sing," that "he can himself also talk and sing without using his larynx." He has explained the mechanism by which he accomplishes this.

He states that he can talk and sing and whistle with absolutely no air passing out of his larynx. "Whistling with the closed larynx is not hard at all. I can whistle and speak with the closed larynx; without using my larynx. I am able to speak in a way that my breathing is absolutely suspended."

To preserve the voice, composers must *write for the voice*. Much of the music written for orchestration effects is ruinous to the voice. Artists

should never attempt to sing music which makes the human voice secondary to orchestral instrumentation. *The human voice is the most sublime instrument, and should forever demand music written for the voice.*

Artists would soon bring composers to a sense of realization of their fault, if they would refuse to sing music written chiefly for orchestration. And good voices would be saved.

The most wonderful singing voices in the world to-day are being produced in America. And there are in America teachers of song as capable as any that live in any country. There are many cogent reasons why the art of song should take on new life and flourish in America. Art must be pursued for Art's sake.

Mme. Cappiani, in her excellent work, "Practical Hints and Helps for Perfection in Singing," asks the question: "Why are so many voices ruined in Europe? If we consider what regiments of students have for the past thirty years been going to Europe, and how few good voices return, we are appalled."

Henry W. Savage (*Opera and the American Singer.*) (*Monthly Section, Pittsburgh Dispatch*, July 10, 1910), says: "The transatlantic steamers sailing from American ports during the months of June, July and August bear from our shores many thousands of American girls going to study music in Europe. And only in rare instances is it true that the outward-bound student has exhausted the facilities and the opportunities for study which are being left behind, at home. We have in this country the finest mu-

sical talent in the world. ‘The finest voices in the world come from America, the biggest, the purest, the most dramatic,’ said *Jean de Reszke* to me. ‘The very best singers in the world come from America,’ said *Tito Ricardo*, of Milan, to me. He is regarded as an authority of the highest rank.”

“I often wish that I could go into the homes of these girls and talk things over with them and their families. I should like to persuade fathers and mothers of the folly of the idea that it is fashionable to send their daughters to Europe for a musical education, to explain to them that the necessities for this course have long since ceased to exist, and to focus their attention upon the fact that home institutions are offering facilities equal to those of Continental schools, and at a much smaller cost.”

“*Let the American pupil remain at home, where the American voice can be better handled than on the Continent, because it is better understood. American institutions offer splendid courses in the technology of music. The best of vocal training may be received here.*”

Students from abroad now come to New York for musical education. *Mme. Mott* can verify this statement.

In Paris, the American singer is looked upon as a “good thing” to be exploited.

A long list of brilliant American trained artists have succeeded in opera, here and abroad, including Putnam Griswold, Frances Macلنnan, Vernon Stiles, Florence Easton, Gertrude Rennyson, William Wegener, William Miller,

Yvonne de Treville, Edward Lankow, Harriet Behnee, Marion Ivelle, Ellison van Hoose, Clarence Whitehill, Alfred Picaver, Robert Kent Parker, Marion Weed, Florence Wickham, Olive Fremstad, Edith Walker, Bessie Abbot and Geraldine Farrar.

Frank E. Miller (The Voice): “There is one great singer, Lillian Nordica, who knows to whom to give credit for that skill in voice-production which enables her to sing Valentine, Aida and Isolde with equal success. Her voice-production she acquired not from Madame This or Signor That, but from plain John O'Neill, of Boston, and she took good care not to allow any other teacher, however ‘famous’ to undo the work of the man who had taught her voice-production based on correct knowledge of the physiology of the voice-producing organs.”

David Bispham (“Why We Should Sing in English,” Century Magazine, July, 1910), says:

“For singing there is nothing difficult about English; it is just as easy as any other language. Are not its vowels the same—its consonants? Are not its words softer than German, and easier to pronounce and more rotund than French? Is it not as noble as Italian? All the arguments against it emanate from those who do not know it, or how to pronounce it either in song or speech.”

“Though we formerly imported singers, it is obvious that we need do so no longer. Soon we can—indeed, we do already—export artists.”

“When will the scales drop from the managerial eyes, and Americans get their chance here

in the same minor parts that at first they have to take abroad?"

"If they can work and grow famous there, they can do here just the same."

Richard Mansfield said, "America has become too great, and its influence abroad too large, for us to afford to have recourse to that ancient and easy method of criticism which decries the American and extols the foreign."

This is true indeed.

Frank E. Miller (The Voice), states:

"The English language is probably the one that has been described by foreigners as the most unfit for singing. Greater calumny has never been uttered. I contend for just the opposite: that English is the very best language for an artistic singer to use for it contains the greatest variety of vocal and aspirate elements, which afford an artistic singer the strongest, most natural and expressive means of dramatic reality. The English language has all the pure vowels and vocal consonants of the Italian; and besides, it is full of rich elements, mixed vowels, diphthongs and an army of vigorous aspirants."

Tosi (Italian School of Florid Song, 1743), says:

"After having corrected the pronunciation, let him take care that the words be uttered in such a manner, that they be distinctly understood, and no one syllable be lost; for if they are not distinguished, the singer deprives the hearer of the greatest part of that delight which vocal music conveys by means of the words. For, if the

words are not heard so as to be understood, there will be no great difference between a human voice and a hautboy. This defect, though one of the greatest, is nowadays more than common, to the greatest disgrace of the professors and the profession."

Salvatore Marchesi (Vademecum) states that:

"It is wholly erroneous to argue that there is a peculiar Italian, French, German or English method of singing. There is only a single aesthetic style in music throughout the civilized world, as well as a single singing method, and that is the *good one*, in the pure and artistic conception of the term."

Mme. Mathilde Marchesi (Method of Singing) says:

"People often speak of the Italian, French or German School or Style of Singing. Having resided for many years in the different centers of these three nationalities, I can safely say that, with the exception of national songs of a popular and local character, peculiar to each nation, there are only two vocal schools in the *whole world*: the *good*, from which the best results are obtained; and the *bad*, in which the reverse is the case. The same may be said with regard to style. It is, therefore, quite a mistake to speak of a German, English, French or Italian Vocal School or Style."

Whether you learn to sing in Italy, France, Germany, or America, the physiology of singing, like the physiology of digestion, is always the same. The process of digestion is the same, no

matter where you eat the food. The process of singing is the same, no matter where you learn it. There is no Italian physiology, no German physiology, no French physiology—it is all human physiology.

Whether you are taught singing in Naples, by *Sebastiani*, in Milan, by *Sabatini*, in London, by *Shakespeare* or *Santley*, in Berlin, by *Mme. Lehmann*, in Paris, by *De Reszke*, in New York by *Mme. Mott*, *Mme. von Klenner*, *George Sweet*, or *Rice*, in Boston, by *Hubbard*, *Mme. Everett* or *Mme. Clara Kathleen Rogers*, the physiology of singing is identical.

History will probably show that the very best in art and the names of the greatest artists only of all periods have been selected for the preservation of the ages. Thus, by comparison, one is led to think that art and artists of the present time are not so great as those of the past. But I hold no such opinion. Masters of art (in speech and song) have passed away. Masters are passing away. Great masters of the art remain.

“The best traditions of the art of singing are, *with very few exceptions, nearly lost.*” (*Salvatore Marchesi.*)

Exceptions prove that the art is not lost.

It should be remembered that in the old days, from which traditions of phenomenally high voices have come down to us, musical pitch was lower than it is now.

Phenomenal voices always have been rare.

At no other time in history, of which I have any knowledge, has there been such general,

powerful and international educational co-operation as now. Ambassadors of education, in the form of exchange professors, are now sent from the United States to Germany, Sweden, Denmark, France and Japan. Never before has there been such a world-wide uplift in the spread of enlightenment in science, art and general culture. Never before has money been so lavishly and universally expended in the pursuit of science, art and education. The establishment of the *Kaiser Wilhelm* professorship at *Columbia University*, and the *Roosevelt* professorship at *Berlin University*, six years ago, was the beginning of this universal uplift. The regents of *Oxford University*, following in the wake of the establishment of these international professorships, made a ruling, in 1909, "that, the students of *Columbia University* in the freshman class shall be admitted to *Oxford* freshman class: that students at *Columbia* in the sophomore, junior and senior classes, shall be admitted to *Oxford's* semester classes on a parity."

There never was a time when money was more lavishly spent than now to further the ends of education, of science, of art, and of all that contributes to the highest and most stable civilization.

True art is built on firm foundations; its mastery requires intelligent comprehension, conscientious application, and an abundance of hard work long continued. High art is maintained by high ideals. High ideals require strength in the character of the votaries.

The first signs of depreciation in any art is perceptible in the lowering of the ideals.

True art is always pure art. Venal considerations always disfigure and destroy.

England once led the world in music. *Italy* has passed her zenith. *America*, replete with native artists, and with abundant means apparently stands upon the threshold of the world's new era in the progress of music.

Letter of Mme. Cappiani.

Question 1.

Are the normal faucial tonsils of any use to singers?

By the term, *normal faucial tonsils*, I mean the tonsils situated in the fauces, between the anterior and posterior palatine arches, in healthy condition, of almond shape, and of such size as not to project beyond the lines of the palatine arches, nor press upon surrounding tissues, upon the superior constrictor, the palato-glossus or palato-pharyngeus muscles, of a size so small as not to interfere with the perfect anatomical outlines of the walls of the pharynx.

Answer. Certainly, they are necessary for the acoustics of the voice, the sounding board of which is in the *nasal bridge* where from all the facial bones connected with each other are awakened to resound to—which by their different shapes give different tones, forming a kind of accord to the one tone we produce. These vibrations together beautify the voice in sympathy and grandeur and give the individual “*timbre de la voix*.”

Question 2. How, or in what manner are they of use to singers, already described?

Answer. If tonsils are cut out, it wants considerable skill to bring the vibrations of whatever tone up in the nasal bridge, as they come too easily from the larynx through the mouth to the listener in a harsh or vulgar tone without that sympathy above described, when all the facial bones are awakened to resonance.

Question 3. Do you personally know of any

instance or instances, in which a singer's voice was improved after removal of normal tonsils?

Answer. No! But the voice may be changed to higher or lower pitch by the cicatrization and the Chirurgeon can not know beforehand which way the result may be. Often the compass of the voice may not be changed at all; only the sounding quality made more ordinary.

Question 4. Do you personally know of any instance or instances in which a singer's voice was impaired or ruined after the removal of normal tonsils?

Answer. A singer's voice cannot be entirely ruined by cutting out the tonsils. It is too great a distance from the tonsils to the vocal-bands in the larynx.

Question 5. Would you, as a rule, advise the removal of normal tonsils in singers?

Answer. No. Only in cases of diseased and so swollen tonsils that danger of suffocation is near. Then *they must be cut out*—as it is better to lose one's tonsils than one's life.

LUISA CAPPANI.

Berlin

December 2d '09
Dec 4 '09

To B. Faehnle Pittsburgh

Dear Sir

Enclosed please find my opinion as to the removing of tonsil, which I was very glad to hear you are decidedly opposed to this growing tendency of Waddington, Turville & Wood to remove it in children, all cases I have found - in the 30 years of my teaching that the voice is injured, often beyond remedy. The tonsils are as necessary for the modulation of the voice as the heart is to breathing, remove the latter & you abetted the progress of breathing / remove the former & you prevent the voice from expanding in a crescendo & drawing & getting you for a diminuendo.

& trust I have made myself plain,
I wish you every success w^t de colde
& natural when so important a subject
to all singers and surgeons, who unfortunately are only too ready to reverse
truths.

yours faithfully
H. Miller
Dr.

J. B. Lampert

I shall be glad to hear further details later on.

CHAPTER X

SIX VOICE QUESTIONS.

Question Number One.

Are the normal faucial tonsils of any use to singers?

By the term, *normal faucial tonsils*, I mean the tonsils situated in the fauces, between the anterior and posterior palatine arches, in healthy condition, of almond shape, and of such size as not to project beyond the lines of the palatine arches, nor press upon the surrounding tissues, upon the superior constrictor, the palato-glossus, or palato-pharyngeus muscles, of a size so small as not to interfere with the perfect anatomical outlines of the walls of the pharynx.

George A. Sweet: "No."

Mme. Marie Olive Fremstad: "No."

Vincenzo Sabatini: "I do not know."

Bonci: "I do not think so."

S. S. Curry: "None that I have ever been able to trace."

David Bispham: "I do not know from my own experience, as I have never had trouble with my tonsils."

Mme. Clara Kathleen Rogers: "Normal faucial tonsils have no *direct* use in singing."

Charles A. Rice: "The normal tonsils are of no use to singers in tone production, nor in giving assistance to the quality of the voice."

David C. Taylor: "No, not of direct use in the

conduct of the voice. Their functioning is no doubt an item in the general vitality, but this is not specifically a matter of voice."

Frederick E. Bristol: "I cannot say if the normal tonsils are of any particular use, or in other words, if they have any function, as regards the proper emission of the voice. I have never seen that they are an obstacle and have never advised their removal."

George Fergusson: "I consider it impossible for singers or teachers to state definitely the use of the tonsils to the singer."

Mme. Irene San Carola: "I hold that one of the most important functions of the singer's art is to produce for the voice a perfectly free passage, through the pharynx, to all resonators. In my opinion, therefore, no part of this passage can be of any use to the singer except in a negative sense, i.e.: in its capability of being kept out of the way. Normal tonsils can—and should—be rendered nugatory by muscular exercise as exemplified in yawning."

Mme. Lillian Nordica: "My tonsils being very small are perfectly healthy. I have never realized that they have played any special part in singing."

Charles A. White: "Who knows?"

William Shakespeare: "I believe no one knows what the functions of the tonsils really are."

Mme. Lilli Lehmann: "I do not believe that anyone can answer this in the right way."

Sir Charles Santley: "I am not prepared to say the tonsils are of any use to singers, especially,

but that they are of use is certain or they would not exist."

Carlo Sebastiani: "Anything belonging to our organism has its function, and its proper reason to exist. Only the excess or the deficiency of any part whatsoever can be of detriment to the organism. As to the first part of this question, the *normal tonsils* they might *perhaps* be of utility to the voice, to modify the resonance, and the timbre. Though it is not proven by me."

Richard Loewenberg: "To prevent misunderstanding by 'normal' tonsils, I mean tonsils of a healthy color, those not enlarged in length or thickness, and showing no evidences of chronic inflammatory processes. Such tonsils should, according to my experience, never be removed by operation, neither on account of the effect upon the general health, nor of the functional activity of the organ itself. Even though the physiological significance of the tonsil still rests upon a hypothesis, this, like any other healthy organ in the body, should be left undisturbed."

Mme. Schumann-Heink: "Yes."

Mme. Luisa Tetrazzini: "Yes."

Miss Cecelia Winter: "Yes."

Arthur J. Hubbard: "They are."

Mme. Alice Garrigue Mott: "In some cases. They preserve the original structure of the throat on which depends the beauty of the individual voice."

Mme. Cappiani: "Certainly, they are necessary for the acoustics of the voice, the sounding board of which is in the *nasal bridge* where from all the facial bones connected with each other are

awakened to resound to—which by their different shapes give different tones, forming a kind of accord to the one tone we produce. These vibrations together beautify the voice in sympathy and grandeur and give the individual “*timbre de la voix.*”

LamPERTI: “Most decidedly, I consider them of the greatest importance to all singers.”

Letter of *Van Baggen.*

Question 1. Have the normal faucial tonsils any function: physiologic, biologic, chemical, phonetic, or other? By *normal* faucial tonsils, I mean the tonsils situated in the fauces, between the anterior and posterior palatine arches, in healthy condition and of such size as not to project beyond the line of the palatine arches nor press upon surrounding tissues, of a size so small as not to interfere with the perfect anatomical outlines of the walls of the pharynx.

Answer. The faucial tonsils have certainly a phonetic function. Their situation in the mouth at a place where the voice receives an essential part of its specific qualities allows us to admit this assertion. The muscles of the anterior and posterior pillars of the fauces between which the tonsils rest, are in constant movement when we are speaking or singing. Their action combined with the movements of the muscles of the soft palate changes the shape of the voice passage at the back of the mouth when we are forming the different vocals or producing tones of different pitch. The position of the tonsils situated as they are between the pillars of the fauces are

of great importance with regard to the enactitude and perfectness of those movements! Also for the resonance the tonsils are of great interest for the voice. With their spongy tissue they can be compared to the felt in the piano which softens the tones and regulates the resonance.

Question 2. What are the functions of the faucial tonsils?

Answer. For my answer to this question, see the first answer.

Question 3. What effects have you observed as being directly due to removal of the faucial tonsils?

Answer. Only in two cases during my experience of eight years the removal of the faucial tonsils was necessary. In both cases the tonsils were of abnormal size. In one of those two cases there was no regular movement of the soft palate and of the pillars of the fauces; especially when forming the initial vocals, a spasmotic contraction of those parts took place, whereby the swollen tonsils were strongly protruded. Every attempt to correct the action of the muscles of the soft palate and the pillars of the fauces remained without any result because of this projection of the tonsils. After their removal the desired effect was obtained by carefully applied exercises.

Question 4. Have you noted phonetic changes after removal of the faucial tonsils?

Answer. The other case where the tonsils were removed, was a singer. There also the removal of the swollen tonsils appeared unavoidable because of the impossibility to correct a nervous contraction of the pillars of the fauces. As a

result of the removal, entire success followed. It did not affect the timbre of the voice; an increase of resonance was observed and she sang with far more ease and less fatigue.

Question 5. Would you, as a rule, advise the removal of normal tonsils?

Answer. No!

Remarks. As I am exclusively a specialist-expert for voice and speech afflictions I considered the questions but from the phonetic point of view.

N. J. Pooch Van Baggen,
Plaats 10a,
The Hague,
Holland.

Addenda to Question Number One.

Frank E. Miller: "They are regulators of pillar action."

Moure: "They have phonetic functions. From a phonetic point of view, their normal rôle must evidently be to prevent in a certain measure the nasality of tone, by maintaining the pillars in the midst of which they are placed."

Van Baggen: "The faucial tonsils have certainly a phonetic function. Their situation in the mouth at a place where the voice receives an essential part of its specific qualities allows us to admit this assertion. The muscles of the anterior and posterior pillars of the fauces, between which the tonsils rest, are in constant movement when we are speaking or singing. Their action combined with the movements of the muscles of

the soft palate changes the shape of the voice passage at the back of the mouth when we are forming the different vocals or producing tones of different pitch. The position of the tonsils, situated as they are between the pillars of the fauces, are of great importance with regard to the exactitude and perfectness of those movements. Also for the resonance the tonsils are of great interest for the voice. With their spongy tissue they can be compared to the felt in the piano which softens the tone and regulates the resonance."

Question Number Two.

How, or in what manner, are normal tonsils of use to singers?

Vincenzo Sabatini: "I do not know."

George A. Sweet: "Of no use."

David Bispham: "I do not know, and do not think a singer should consider his physical formation *at all*, if it is healthy, and *as little as possible*, if it is (or he thinks it is) sick."

Richard Loewenberg: "Same answer as to question number one."

Frederick E. Bristol: "The answer to question number one is my answer to this question."

George Fergusson: "I do not think the statement of an early teacher of mine—an Italian tenor—to the effect that the tonsils lent brilliancy to the tone, is of any value whatever."

Mme. Lillian Nordica: "I have never been conscious of possessing tonsils—so know of no use—but presume they are there for a purpose."

Mme. Irene San Carola: "I consider that they are of no special use to singers as such, though doubtless they are factors both in pharyngeal and general health, or they would not be there."

Charles A. White: "Who knows?"

Carlo Sebastiani: "As I have said, the utility of the *normal tonsils* in singers has not been proved or demonstrated, as to what might be their special function in the emission of the voice. I have been able to verify that the larger the development of the tonsils, the more difficult is the resonance and the emission of the tones of the second register or high notes: even the removal

of the *normal tonsils* does not facilitate these high tones."

Mme. Luisa Tetrazzini: "They protect the vocal cords from dust, microbes, etc., also being part of a normal throat cannot be removed without doing injury."

Mme. Schumann-Heink: "They guard the throat, supply fluid secretion, are a link in the chain. They were put there by nature. We can get along with one leg, one eye, etc., but we can get along better with two."

S. S. Curry: "I cannot see any use except as they affect the overtones of the voice; all the chambers of the pharynx and of the head, and even the whole body affect the resonance of the voice. When the tonsils are abnormal, they affect it slightly in this way."

Mme. Clara Kathleen Rogers: "Only as factors in forming the perfect resonator."

Miss Cecelia Winter: "In healthy condition, they round out what would otherwise be an irregular cavity without power of adding resonance. Since the fauces are not firm enough in material to be of any use as added resonators and from the standpoint of tone-quality any distortion of the air wave in passing them would be more detrimental than advantageous. It is considered well to have a diseased tonsil that protrudes removed for the same reason."

Mme. Alice Garrigue Mott: "The normal faucial tonsils are of use to the singer, in so far as they preserve the original structure of the throat, on which depends the beauty of the individual voice."

Arthur J. Hubbard: "We are not *sure how*, but we know that their removal causes a difficulty in assuming different shapes of the pharynx necessary in singing, causing a hardness of quality and laborious action."

Mme. Cappiani: "Already described. If tonsils are cut out it wants considerable skill to bring the vibrations of whatever tone up in the nasal bridge, as they come too easily from the larynx through the mouth to the listener in a harsh or vulgar tone, without that sympathy above described when all the facial bones are awakened to resonance."

Lamperti: "The tonsils are *most necessary* for *modulation* in singing: without them it is very difficult, sometimes impossible, for the voice to modulate. They assist in expanding and in withdrawing the tones."

Question Number Three.

Do you personally know of any instance, or instances, in which a singer's voice was improved after removal of normal tonsils?

Mme. Olive Fremstad: "Yes."

Jean de Reszke: "I only know of one case among my pupils of the tonsils having been removed. The operation was most successfully performed, and the result excellent. The pupil's voice is now better than ever and she no longer suffers from sore throat, as she did before the operation."

Van Baggan: "Only in two cases during my experience of eight years, the removal of the faucial tonsils was necessary. In both cases, the tonsils were of abnormal size. In one of these two cases, there was no regular movement of the soft palate, and of the pillars of the fauces; especially when forming the initial vocals a spasmodic contraction of those places took place, whereby the swollen tonsils were strongly protruded. Every attempt to correct the action of the muscles of the soft palate and the pillars of the fauces remained without any results because of this projection of the tonsils. After their removal the desired effect was obtained by carefully applied exercises."

Carlo Sebastiani: "I have been able to verify that some time after the excision of the tonsils, the voice has improved, the resonance facilitated and the color of the voice also improved. I here speak of tonsils, *not* normal but of tonsils *hypertrophic* and *hyperplastic*. In this case the ex-

cision has been of some good, because they were an impediment to the normal function of the soft palate."

Charles A. White: "Never heard of the removal of tonsils except for the reason that they were abnormally large or diseased."

S. S. Curry: "I have never to my knowledge taught a case that had the *normal* tonsils removed. When abnormal tonsils have been removed, there is a slight improvement in resonance."

Charles A. Rice: "No. To remove any part or portion of a *normal* tonsil is unnecessary and will in no way aid the singer's voice in tone production or in quality."

Mme. Irene San Carola: "No. And even when tonsils are abnormally large, I always oppose any proposal to remove them by surgery. I prefer to try every other means of reducing them and I have had considerable success in my methods."

Mme. Alice Garrigue Mott: "I know no case in which the singer's voice was improved by the removal of *normal* tonsils."

Mme. Lillian Nordica: "I do not. If any of my comrades have had their *normal* tonsils taken out, I have never heard of it."

Sir Charles Santley: "I do not know of any instance of improvement or injury to a singer's voice after removal of the tonsils."

Frederick E. Bristol: "Have never seen any singer whose *normal* tonsils have been removed, so far as I know."

Mme. Clara Kathleen Rogers: "I have never

known of the removal of *normal* tonsils from the throat of a singer."

George A. Sweet: "No."

Mme. Schumann-Heink: "No. Decidedly no."

Mme. Luisa Tetrazzini: "No."

David Bispham: "No."

Bonci: "I do not."

Stephen Townsend: "No."

David C. Taylor: "No."

Miss Cecelia Winter: "No."

Arthur J. Hubbard: "No. On the contrary, a deterioration in quality of voice and of ease in singing."

Richard Loewenberg: "I do not know of any case in which a singer's voice was improved by the removal of normal tonsils. On the contrary."

Mme. Cappiani: "No! But the voice may be changed to higher or lower pitch by the cicatrization, what the chirurgeon cannot know beforehand, which way the result will be. Often the compass of the voice may not be changed at all; only the sounding quality becomes more ordinary."

Lamperti: "No. If the tonsils are *normal*, they should on *no account* be removed, as the removal will never improve the voice. If *abnormal*, *only the projecting part* should be most carefully removed, never the whole tonsil taken out, but merely the diseased part cut off. *I am decidedly opposed to the growing tendency of having tonsils cut and removed.*"

LETTER OF DR. LOEWENBERG.**Translation.**

Berlin W.,

62 Keith Street, 22nd March, 1912.

**Richard B. Faulkner, M.D.,
806 Diamond Bank Building, Pittsburgh, Pa.**

MY DEAR DOCTOR:—I received your short letter of January 9th, and thank you for your expression of confidence in my opinion concerning the questions under consideration, and gladly express my opinion as follows:

(1) In the first place, to prevent misunderstanding, by "normal" tonsils, I mean tonsils of a healthy color, those not enlarged in length or thickness, and showing no evidences of chronic inflammatory processes. Such tonsils should, according to my experience, never be removed by operation, neither on account of the effect upon the general health, nor of the functional activity of the organ itself. Even though the physiological significance of the tonsil still rests upon a hypothesis, these, like any other healthy organ in the body, should be left undisturbed.

(2) These remarks will also answer question Number 1.

(3) I do not know of any case in which a singer's voice was improved on the removal of normal tonsils.

(4) On the contrary, I know of cases in which the removal of normal tonsils has caused permanent detrimental effects to the voice, in conse-

quence of the unavoidable injury to the arches of the palate (adhesions, scar tissue, etc.).

(5) For these reasons, I disapprove of operation upon normal tonsils in all cases.

I am always glad to be of service.

Sincerely,

(Signed) DR. RICHARD LOEWENBERG.

Question Number Four.

Do you personally know of any instance, or instances, in which a singer's voice was impaired or ruined, after the removal of normal tonsils?

Richard Loewenberg: "I know of cases in which the removal of normal tonsils has caused permanent detrimental effects to the voice, in consequence of the unavoidable injury to the arches of the palate (adhesions, scar tissue, etc.)."

David Bispham: "Most persons have constant trouble after such an operation, and though their voices are not "ruined" the healthy operation of the parts that contribute to good singing is *interfered with*."

Mme. Alice Garrigue Mott: "I recall no case where a singer's voice was *ruined* after removal of the tonsils. I know many cases where the removal of tonsils has made a change for the worse in quality."

Mme. Katherine E. von Klenner: "Yes; many."

Mme. Schumann-Heink: "I know of several. The voice became acid, uncertain, weak or rough, or was entirely ruined."

Carlo Sebastiani: "Often the voice has been damaged if the operation on the tonsils was not necessary, but simply performed for the desire to increase or to improve the voice, as it has been practiced by some artists whom to deficiency of vocal faculties and the mediocrity of talent, they want to substitute the surgical instruments. In similar cases, the voice has been *damaged* and sometimes *entirely lost*:

"(1) Because the too frequent use and not enough justified to alter with surgical instruments so delicate an organ as that of the voice, it is not well for the clearness, the exercise, the color and facility of the voice;

"(2) Because the tissues, the nerves, the muscles, always remain depreciated from an operation that was not compulsory to avoid greater damages."

Mme. Luisa Cappiani: "A singer's voice cannot be entirely ruined by cutting out the tonsils. It is too great a distance from tonsils to the vocal bands in the larynx."

Mme. Marie L. Everett: "I am fully prepared to say—indeed, am convinced—that with the removal of the tonsils, the voice loses much of its *personal* quality; and much of its *frontal focus*—or in other words—*something* is missed in the quality after the tonsils have been removed that does not come back. The tone seems *dispersed*—not as well forward—and lacks its usual brilliancy of resonance."

Arthur J. Hubbard: "Not ruined, but impaired."

David C. Taylor: "I know of two instances, neither one of which was my pupil, of voice impairment following some months after the removal of tonsils which I was informed, were normal. But I cannot state that this impairment was due to the removal of the tonsils, as several other causes might have operated."

Mme. Irene San Carola: "No, not personally—though I have heard of such instances—and such mutilations would, *prima facie*, appear to

me as not only useless but likely to limit potentialities."

Charles A. White: "Normal, no. Abnormal, yes—improved."

Charles A. Rice: "I have known of cases where loss of voice had been attributed to the removal of the tonsils, and the conditions appeared to verify the conclusion, but in several instances where I have had the opportunity of working with the voice after it had been pronounced ruined, it has developed that the trouble came *not* from the removal of the tonsils, but from the teachers' lack of knowledge in vocal physiology and tone production. The pain and imaginary troubles of the singer's tonsils are invariably due to wrong tone production (i.e.: placement of the voice). This I have proved many times with students who came to me with the impression that their tonsils would have to be removed, but after a few weeks' study all the throat trouble had disappeared without an operation."

Mme. Lillian Nordica: "I do not. And I have never heard of removing normal tonsils any more than removing a normal vocal cord."

Bonci: "I do not."

Miss Cecelia Winter: "I know of no singer who ever had a normal tonsil removed."

Sabatini: "Same answer as Number 8."

Mme. Clara Kathleen Rogers: "No."

Mme. Olive Fremstad: "No."

George A. Sweet: "No."

Stephen Townsend: "No."

S. S. Curry: "No."

Frederick E. Bristol: "No."

Question Number Five.

Would you, as a rule, advise the removal of normal tonsils in singers?

Lamperti: "Most decidedly not; as long as they are normal, they are far too necessary in singing and *only* when *greatly* enlarged should the diseased part be removed, never the entire tonsil."

Richard Loewenberg: "I disapprove of operation upon normal tonsils in all cases."

Mme. Lilli Lehmann: "No. I *never* would advise the removal of *anything* from the throat (of a singer)."

Jean de Reszke: "I do not believe in removing the tonsils unless they are abnormally developed, but certainly would recommend the operation being performed in any case where a singer is troubled by unusually large tonsils."

Sir Charles Santley: "Certainly, I would not advise the removal of the tonsils under any ordinary circumstances, but attack the root of the evil, the ill-treated stomach."

Carlo Sebastiani: "No; unless the operation has been deemed necessary in the opinion of the physician, to avoid grave misery and special pathological cases. These cases must be separately studied in each individual by the physician."

Mme. Cappiani: "No. Only in cases of diseased and such swollen tonsils that danger of suffocation is near, then they must be cut out, as it is better to lose one's tonsils than one's life."

George A. Sweet: "No, I have never advo-

cated the removal of a singer's tonsils, except in extreme cases, when chronically enlarged from colds covering periods of many years—or resulting from organic disease (scrofula)."

Charles A. Rice: "Never. The removal of the normal tonsils is an unnecessary operation and accomplishes nothing; therefore, I would not sanction such an operation."

Stephen Townsend: "No."

George Fergusson: "I have had no experience with singers who have had the normal tonsils removed. Personally I am opposed to their removal in a normal state."

Arthur J. Hubbard: "No, most decidedly. During twenty odd years of experience, I have encountered many cases of diseased and troublesome tonsils. My conclusions based on careful observation of the treatment given them are that normal tonsils are useful and should never be removed. And also, when diseased ones are removed, as should always be done, great care should be exercised *not to cut deeply*. In fact to leave enough to constitute what would be generally called a normal tonsil. In many cases among my pupils, I have observed nothing but good results from the removal of diseased tonsils, when done in the manner above indicated. But I have known great harm to be done when the operation has extended too far."

Mme. Alice Garrigue Mott: "I never advise removal of normal tonsils."

Mme. Clara Kathleen Rogers: "Certainly not."

Mme. Katherine E. Von Klenner: "No."

Mme. Lillian Nordica: "I certainly deprecate meddling with normal organs. I have never had my throat touched, or sprayed, in my life."

Mme. Luisa Tetrazzini: "Never."

Mme. Olive Fremstad: "No."

Miss Cecelia Winter: "No."

Mme. Irene San Carola: "Certainly not. I consider that a perfect control of all parts of the pharynx, as well as of all organs engaged in voice production, can and should be acquired through exercise for the development of the particular muscles employed."

Mme. Marie L. Everett: "I thoroughly believe in having tonsils removed that are troublesome. They often are but a *trap* for disease. But I certainly have noticed a loss in the *personality*, and in the warmth or *coloring* of the tone in those pupils who have had the tonsils removed during the period of study with me. I have a case I am studying now—a pupil who had tonsils removed in the summer—tone *larger, clearer—but less beauty*—the personal *charm* seems affected."

Frederick E. Bristol: "I would not—in fact I am very much opposed to any surgery in connection with the throat and nose, except in cases where the tonsils have grown to an abnormal size, or where there are growths on the vocal cords which cannot be removed in any other way. I have known of two instances where enlarged tonsils were removed to the great injury of the voice, and I have had several cases come under my observation where benefit accrued by their removal. I have always attributed the former cases to a

bungling operation. I am drifting farther and farther away from resorting to surgery, and have been pleased to note that in very many cases the cure of any trouble has been effected through a *normal* use of the voice, produced upon a correct method. Please observe that I do not say there may not be need in *some* cases of surgery."

A. Bonci: "No, unless there is some special reason."

David Bispham: "CERTAINLY NOT!!"

Vincenzo Sabatini: "No."

S. S. Curry: "I can see no reason for the removal of normal tonsils."

DAVID C. TAYLOR: "Not under any conditions."

Charles A. White: "Never."

LETTER OF SEBASTIANI.

Translation.

Richard B. Faulkner, M.D. (Columbia),
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Pittsburgh, Pa.

Answer to Question No. 1. Anything belonging to our organism has its function and its proper reason to exist. Only the excess or the deficiency of any part whatsoever can be of detriment to the organism. As to the first part of this question, the *normal tonsils*, they might, *perhaps*, be of utility to the voice, to modify the resonance and the timbre. Though it is not proven by me.

Answer to Question No. 2. As I aforesaid,

the utility of the *normal tonsils* in singers is not proven or demonstrated, or what might be their special function in the emission of the voice. I have been able to verify that the larger the development of the tonsils, the more difficult is the resonance and the emission of the tones of the second register or high tones: even the removal of the *normal tonsils* does not facilitate these high tones.

Answer to Question No. 3. I have been able to certify that some time after the excision of the tonsils, the voice has improved, the resonance facilitated and the color of the voice also improved. I here speak of tonsils, *not* normal, but of tonsils *hypertrophic* and *hyperplastic*. In this case, the excision of the tonsils has been of some good, because they were an impediment to the normal function of the soft palate.

Answer to Question No. 4. Often the voice has been damaged if the operation on the tonsils *was not necessary*, but simply performed with the desire to increase or to improve the voice, as has been practiced by some artists, when, for deficiency of vocal faculties and the mediocrity of talent, they wished to substitute the surgical instrument. In similar cases, the voice has been damaged and sometimes entirely lost:

(1) Because the too frequent use and not enough justified to alter with surgical instruments so delicate an organ as that of the voice, it is not well for the clearness, the exercise, the color and facility of the voice;

(2) Because the tissues, the nerves, the muscles, always remain depreciated from an opera-

tion that was not compulsory to avoid greater damage.

Answer to Question No. 5. No, unless the operation has been deemed necessary in the opinion of the physician, to avoid grave misery and special pathological conditions. These questions must be separately studied in each individual by the physician.

Remarks: (1) The function of the tonsils is not known.

(2) The benefit that may be derived by the excision of the tonsils, if it is of great utility in cases of hypertrophy, to avoid greater damage, it may be of some benefit to the human voice in general: it may not be of any benefit to specialized organisms endowed with exceptional and valuable voices, said voices being of great value precisely for the virtue of the *mucosa* tissues; for the softness of the muscles and nerves; for the perfection of the different cavities of resonance; finally, for the marvelous structure of the entire vocal apparatus.

Then

In these uncommon conditions, any surgical operation whatsoever, it matters not how perfect, may cause harm to the precious instrument.

(Signed) CARLO SEBASTIANI.

Napoli, March 31, 1910.

Question Number Six.**Remarks?**

William Shakespeare: "I suspect that most swollen tonsils are the result of a rigid manner of using the voice, both in singing and in speaking.

My own pupils have no difficulty with the tonsils, and generally I am looked at askance by throat specialists as a kind of enemy, which I am *not*. Should swollen tonsils arise from, say, constitutional weakness, I feel they may be removed with advantage. A skilful surgeon can do this without cutting into the adjacent muscles, but I have had pupils who have suffered from faulty operation."

Vincenzo Sabatini: "Only time I have ever recommended removal of the tonsils has been in cases where they were *abnormal*, and the result has always been a marked improvement in the voice. But *when normal*, the best advice is to leave them *alone*."

Mme. Clara Kathleen Rogers: "My observations and experience lead me to the following conclusions: In a healthy, normal throat each part has its proven normal function, passive or active, direct or indirect: That the emission of vocal sound, given a musical sense and impulse, follows naturally a healthy condition of the whole throat as nature made it; and that disease or malformation alone warrants the removal of the tonsils, just as the intervention of surgery is required for a hare lip or a tied tongue."

Mme. Irene San Carola: "My whole scheme

of instruction is opposed to any avoidable interference with nature, being based on the conviction that intelligent use of the natural means for the full development of the vocal organs eventuates in an ability to control every part of the machinery of voice production."

Mme. Katherine E. von Klenner: "I make a point in replying to your questions upon the word *normal* in each case. My observations agree with those of my teachers, Manuel Garcia and Pauline Viardot-Garcia, both of whom objected seriously to any artificial means for improving the singing voice—where the vocal apparatus was *normal*. When removed, I have always found a certain lack of sweetness in the tone quality—and difficulty in supporting the tone in certain registers."

Charles A. Rice: "An abnormal tonsil will disturb or impair both quality and tone placement by displacing the walls of the pharynx, etc. The poor tonsils are made the scapegoat for almost all the failures of the vocal student. When there is a failure in the voice, the teachers blame the tonsils, never themselves.

"As to singing, the normal tonsils give the pupil no inconvenience; in fact, they never know that they have such a thing when the voice is properly placed. In *proper* voice placement and tone production, the tonsils always remain normal, but nothing will enlarge the tonsils as quickly as *bad* placement of the voice. Not only are the tonsils enlarged, but the intrinsic muscles are often impaired, and sometimes this extends to a paralysis of the arytenoids. Then the ton-

sils are removed, with little or no relief, for the trouble has not been with the tonsils, but caused by strain on the entire vocal apparatus.

"After studying with some twenty or more vocal teachers, I found *only one* that understood vocal physiology and could place the voice from scientific knowledge. A vocal teacher must be more than a person that has studied to train his own voice. Find the teacher that has *studied to teach*, one that puts himself through some of the studies and researches that a physician has to go through, and has developed and made a success with his own voice (if he cannot develop his own voice in tone placement and quality, he cannot train others), and you are likely to find a vocal teacher or trainer of the voice."

Sir Charles Santley: "My experience is that they (the tonsils) contract an unhealthy condition through 'inattention to diet,' an error to which singers as a rule are addicted. If people would confine themselves to what is good for them and not insist upon merely pleasing the palate, neither their tonsils nor their systems in general would suffer much."

Stephen Townsend: "To me it is very difficult to conceive of any one having a normal tonsil removed. I can see nothing to be gained by such an operation. Just what the use is of the tonsils, its function, is, I believe, a mooted question even among the medical profession.

"There is every reason why an enlarged, diseased tonsil should be taken out, and this is appreciated as much by the vocal instructor as by the medical man. It, however, requires a skil-

ful operator to perform this operation, as a bungling 'job' is very liable to more or less impair the voice, at least for a longer or shorter period."

Miss Cecelia Winter: "It is a well-known fact amongst singers that the throats that have not been tampered with surgically are the strongest and least apt to be subject to indispositions from the weather, etc."

David Bispham: "Most persons have constant trouble after removal of the tonsils, and though their voices are not 'ruined,' the healthy operation of the parts that contribute to good singing is *interfered with*. I am sure the 'doctor habit' is bad for a singer and his throat, and that the more he goes to throat specialists, the worse he becomes. I am also sure that the vocal cords should *never* be touched *on any account*, and that the application of acids and sprays to throat and nose only tends to continue any irritation that may be and that doctors are not sufficiently careful to ascertain the personal equations—as it were—of their patients. I am a well man and singer to-day because I do not go to throat specialists any longer! Excuse my frankness—but you want my opinion, I take it."

Mme. Schumann-Heink: "There is nothing **I** am more violently opposed to than any radical treatment of a singer's throat.

More voices are ruined by ignorant throat specialists than by use. Dry powders, scraping operations, acids, instead of rest, massage and oil, do the greatest damage to singers. My specialist has enabled me to sing oftentimes when **I**

believed there was not a note in my throat, by applications of oil, oil, oil, and if any heroic measures were necessary, they were used only after a coating of oil, and only in the mildest form. A mild electric treatment externally on the chest and neck and back was an infrequent treatment."

Mme. Lilli Lehmann: "No, I never would advise the removal of *anything* from the throat and would always *try* to cure it without any operation. If someone is troubled with something in his throat, you never can tell the cause if you don't know the person well and his manner of singing. I am quite sure that *every* bad standard of health in the throat can be cured in learning *how* to use properly all the muscles. But how seldom are they used! NEVER *with knowledge*. Singers who sing *well*, as they should do, will never be troubled by anything. We do *not* feel the faucial tonsils nor the vocal cords; we can arrange our tones with all our organs, to make them perfect, quite high and low enough, strong and soft at once. You should know well both the person and his manner of singing. I can only say that *I* in my whole life never had a suffering pupil because they sang right. I am *sure* that every organ, vocal organ, or muscle, etc., in an ill way, may trouble some people. But if you don't know *how* they speak or sing, you never can be sure of the reason: whether the trouble comes from false usage of the vocal organs, or whether the false (bad) singing or speaking comes from a bad condition of the vocal organs."

Mme. Lillian Nordica: "One should so sing as

not to injure one's self. Something is very wrong when after singing the throat or nose or lungs, or any one part of the body, suffers. A general fatigue should follow—such as a few hours' sleep will repair. So it seems to me I would let normal organs alone."

Mme. Cappiani: "It is wrong and very wrong to have the tonsils removed.

"(1) Tonsils are full of blood, situated in the fauces like two stoves warming the outside winter air, before it reaches the bronchial tubes and lungs, thus *preventing* bronchitis, pulmonitis, etc., etc.

"(2) Tonsils are guardians against hard substances: they close instinctively, like the eyes do when an object comes near them, and often *hind*er the hard substances to be swallowed."

Carlo Sebastiani: "(1) The function of the tonsils is not known. (2) The benefit that can be derived by the excision of the tonsils, if it is of great utility in cases of hypertrophy, to avoid greater damages, it may be of some benefit to the human voice in general; it may not be of any benefit to specialized organisms endowed with exceptional and valuable voices, said voices being of great value precisely for the virtue of the *mucosa* tissues; for the softness of the muscles and nerves; for the perfection of the different cavities of resonance; finally, for the marvelous structure of all the vocal conduct.

"*Then*, in these uncommon conditions any surgical operation whatsoever, it matters not how perfect, can cause harm to the precious instrument."

Lamperti: "I am decidedly opposed to the growing tendency of having tonsils cut and removed. In almost all cases I have found—in the fifty years of my teaching—that the voice is injured, *often beyond remedy*. The tonsils are as necessary in the *modulation* of the voice as the nostril is to breathing; remove the latter, and you obstruct the passage of breathing, remove the former and you prevent the voice from expanding in a crescendo and drawing together again for a diminuendo.

"I trust I have made myself plain. I wish you every success in the collection of material upon so important a subject to all singers, who unfortunately are only too ready to remove tonsils."

CHAPTER XI

DIAGNOSIS.

The scientific consideration of the organ necessarily rests upon a clear conception of what constitutes a normal faucial tonsil—a scientific definition is essential.

The scientific treatment of diseases of the tonsil depends primarily and absolutely upon a correct diagnosis. A faulty diagnosis vitiates therapeutic success. To treat without a diagnosis is a clear case of the blind leading the blind into pitfalls. He who fails to make every effort to establish an accurate diagnosis is unworthy of scientific consideration. And what of him who attempts to minimize its value? The treatment of any disease, of any organ, without a diagnosis, is a hazardous performance.

Sajous, in his great work on the *Internal Secretions*, declares that *at the present day* investigators do not avail themselves of the enormous array of solid data available to ascertain the truth: and that the confusion which characterizes the medicine of our day is due to the habit of theorizing with a few facts as foundation.

With the purpose of simplifying diagnosis, I divide diseases of the tonsil into six groups, namely:

- (1) Primary.
- (2) Secondary.
- (3) Symptomatic.

- (4) Reflex.
- (5) Mechanical.
- (6) Hyperplastic.

Primary.

Von Levinstein thinks that many diseases find their entrance to the organism through the tonsil, but he believes that the infection theory of *Winslow* is too extreme when it considers the tonsil as a menace to the organism.

We are not entitled to talk of a danger to the organism from this organ.

Von Levinstein admits that angina follows coryza, but he does not concede that it is always secondary to nasal affection. That the latter mode of infection does not happen rarely *Von Levinstein* has conceded. He also mentions the well-known angina following endonasal operation, called by *Fränkel* "angina traumatica," in which the germs are transported from the nose via the lymph vessels to the tonsil. *Von Levinstein* emphasizes that primary disease of the tonsils is a common occurrence and that the primary disease of the lymphatic apparatus can be observed at least as frequently as the primary disease of the other organs of the throat.

Von Levinstein states that he has sometimes been able to prove that a patient first suffers from an angina which is followed in a few days by an acute catarrh in the nose, so that in these cases angina is the primary disease. The possibility of primary infection of the faucial tonsil is conceded by the advocates of the protective

theory only when the protective mechanism is disturbed.

Schoenemann states that the ordinary anginous affection of the tonsil is not a primary disease, but is always secondary to catarrh of the nasal mucous membrane.

Goerke considers primary disease of the tonsil possible only when the protective mechanism is disturbed, either through a direct injury or through a cold, and that the organ rarely becomes a victim of primary infection.

If the tonsil is in a state of acute infection, we should consider whether the disease is local or general.

The observation of *Stöhr* that the epithelium of the tonsil sometimes represents an open wound, thus making it easy for micro-organisms to here enter into the organism, has been well refuted by *Fränkel* and *Jacobi*.

The observation of *Stöhr* sometimes spoken of as *Stöhr's phenomenon*, is seen especially in the fossula tonsillaris. Everywhere in the fossula white blood corpuscles are seen passing through the epithelium. The immigration at certain places is so strong that it is difficult to find the epithelium.

If we assume, as *Fränkel* states, that the lymphatic current simply takes along the lymphocytes like the river carries logs, we have to omit the idea that we have to consider here an open wound but that we have to learn to consider it a protective mechanism, for the micro-organisms would have to swim against the current and meet cells which possess a certain phagocytosis.

If, as *Fränkel* states, in the immigration of white corpuscles through the walls of the blood vessels, no holes are made in the walls of these vessels, neither is it necessary that holes are formed in the epithelium of the tonsil when lymphocytes pass through. The insult to the epithelium by the current loaded with lymphocytes does not produce the effect that microbes get more easily into the tissues, as the intervals in the epithelium are constantly filled with the lymph current, and the possible lesions to the epithelium are never lasting defects, but disappear as soon as the intensity of the current is diminished, and then the epithelium layer closes instantly. It seems to be sufficient that the clefts between the epithelium cells allow the lymphocytes to pass, and that only exceptionally, as *Stöhr* has pictured, there are large streaks in the epithelium which really look like an open wound. I was compelled to make these foregoing explanations, *Fränkel* remarks, because they are important in studying the infectious diseases of the pharynx.

Jacobi remarks that "clinical observations will rarely be numerous enough to decide the exclusive or partial port of entry of a poison into the circulation. For we are seldom in a position to separate the tonsil from its neighborhood during the acute invasion or the rapid progress of a microbic or toxic poison." He states that "dozens of years ago he could prove that diphtheria, when limited to the tonsils, was least dangerous. That the thousands of other lymph bodies dis-

seminated in the fauces and posterior nares are more guilty than the two dozen which form the tonsils. It is they that should be considered in the preventive treatment of all the infectious diseases of childhood. In cases of membranous throat disease, whenever the membrane is limited to the tonsil there is little or no glandular swelling in the neighborhood. On the other hand, if a membrane extends from the tonsil to its neighborhood, or starts at a distance from the tonsil, neighboring lymph bodies swell at once. *These clinical observations,*" Jacobi states, "have stood the test of time and must be reckoned with. Microbic invasion through the tonsil is not predominant over that which takes place through the lymph apparatus of the pharynx."

"Almost like injection material," Jacobi continues to remark, "living invading material may enter the lymph or the blood circulation, provided there is a break in the wall, but not with the same facility as injection material forced in. A surface lesion must always be supposed to exist when a living germ or toxin is to find access."

"If that were not so," Jacobi states, "no human or inferior animal could exist under the clouds of microbes and toxins surrounding us. It looks rational, therefore, to admit that when there is merely a surface lesion, though ever so slight, there may be an invasion into the tonsil. When, however, the vessels are exposed to pressure by newly formed cells or tissue, there is no invasion, certainly not beyond the tonsil itself, no ganglionic swelling, and no toxic poisoning.

It is even rational to believe that now and then when tonsils, or what is more common, a single follicle, becomes inflamed, the very venous obstruction will exert the bactericidal influence of the stagnating blood serum."

There are no lymphatic sinuses around the tonsil, according to *Retterer*, *Labbé*, *Hodenpyl* and *Most*.

The lymph current near the tonsil is less active than that of the pharynx at some distance, according to *Labbé* and *Hodenpyl*. *Retterer* proved that the *periphery of the lobules* of the tonsil is more *vascular* than the centers.

In the experiments of *Lexer* the emulsions of bacteria which he brushed on the tonsils only occasionally entered into the tonsillar tissue. *Goerke* believes that in the experiments of *Lexer* the infection did not occur through the tonsil but through other parts of the mucous membrane of the pharynx.

Menzer, in his experiments and researches found in persons who suffered from acute articular rheumatism streptococci in the tonsils only within the epithelium layer and he could prove, on the other hand, that a larger amount of infectious germs were present in the connective tissues surrounding the tonsils.

Goodale injected carmine powder directly into the fossula of the faucial tonsil. Upon microscopic examination he found carmine powder within and underneath the epithelium. *Brieger* and *Goerke* do not consider *Goodale's* experiment free from objection. The colored particles

were injected with a certain energy. How can we exclude the possibility that the foreign particles were forcibly put into the tonsillar tissue, through tearing the epithelium; but granting, says *Goerke*, that artificial tearing did not occur, even then, the experiment proves nothing. Is it not very probable, asks *Goerke*, that by filling up a fossula the free flow of the lymphatic fluid is interfered with, and therefore, the lymphatic current which can flow to all points of the epithelium at this point of greatest resistance is turned and flows to many other points of lesser resistance, taking along particles of the foreign material injected into the fossula?

Grober demonstrated the comparative absence of a *direct* communication of the tonsil with the rest of the body through the surrounding fibrous capsule. His injections into the tonsils accumulated in large quantities underneath the capsule. Thus it happened that the organ was often enlarged to a considerable extent.

In order to diagnosticate tonsillar diseases a knowledge of infectious processes is absolutely essential as well as a knowledge of the anatomy and clinical features of the tonsil.

The mucous membrane of the mouth harbors at all times large numbers of cocci, bacilli and spirillae, and among these are often found micro-organisms of violent character.

The infection of the tonsil from its outside surface is by the same process of infection that occurs on the outside surface of any other part of the body.

There is no proof that the normal epithelium

of the tonsil ever presents an open wound, as claimed by Stöhr.

There is no proof that the normal tonsil is ever a port of entry, an open door, for infectious germs.

There is no proof that the normal tonsil has any absorbent power whatever.

The fossulae of the tonsil are lined with mucous membranes having the ordinary function of other mucous membranes so far as known.

The blood supply to the tonsil is scant; and it has little or no communication with *Waldeyer's lymphatic ring*. The faucial tonsil differs in anatomical character from other tonsils, and from other lymphatic tissues. The external deep surface is *encased in a firmly adherent, strong, fibrous sheath*.

Nothing like this capsule surrounds any other lymphatic body. So dense and tendinous and strongly adherent is this capsule that one may consider the organ as being armor-plated. It is not perforated by lymphatics, nerves, arteries or veins. And from the standpoint of diagnosis, and the possible invasion of the tonsil by the infection process, it is also well to remember, *that the capsule sends a network of fibrous tissue as outrunners along the walls of the blood vessels. The capsule also sends connective tissue into and between the folds of the mucosa.*

Thick or thin, the fibrous sheath is firm and solid. That is why abscesses do not open into the maxillo-pharyngeal space. And that is why it is difficult for bacteria and toxins to enter the tonsil from that point. The capsule with its out-

runners protect the tonsil from invasion. The capsule is not an anatomical accident. It is always present.

In the diagnosis of primary disease of the fau-
cial tonsil, I draw attention to the following
points:

1. There are no lymphatic sinuses round the tonsil.
2. The lymph current near the tonsil is less active than that of the pharynx at some distance.
3. The tonsil and its immediate neighborhood are inferior in regard to facilities for absorption to the rest of the pharynx and nares.
4. There is a comparative absence of direct communication of the tonsil with the rest of the body through the surrounding fibrous capsule.
5. We must distinguish the true from the false hypertrophies: the merely swollen from the hyperplastic organ.
6. It is necessary to distinguish the normal from the pathologic organ.
7. Involution is an expression of immunity against certain infections peculiar to children. The removal of simple hypertrophic tonsils, as a rule, causes no febrile reaction. The removal of *enchatonéed* tonsils, as a rule, causes more or less febrile reaction.
8. Persons with enlarged tonsils are generally healthy.
9. The number of newly found lymphocytes is always considerably larger in the hyperplastic tonsil than in the normal.
10. The flow of lymphocytes through the

epithelium to its surface is always increased when the tonsil is enlarged.

11. *Brieger's* suction therapy is intended to encourage the outward flow of lymphocytes from the center of the tonsil to the surface of the epithelium.

12. Acute inflammation of the tonsil shows an increased infiltration with leucocytes which causes enlargement of the organ, also an increased amount of lymph in the intercellular spaces.

13. Not only do the faucial and pharyngeal tonsils atrophy normally at a certain age, but the same change occurs at the same time in the lymphatic tissues of the digestive tube.

14. Primary disease of the tonsil is favored by bacterial or toxic invasion of the pharyngeal secretions.

15. A surface lesion must always exist when a germ or toxin is to find access.

16. When the vessels of the tonsils are exposed to pressure by newly formed cells or tissue, there is no invasion.

17. When the tonsil or a single follicle becomes inflamed, the venous obstruction will exert the bactericidal influence of the stagnating serum.

18. Exposure, and many diseases, change the structure and harden the surface of the tonsil.

19. Cell infiltration and cicatricial tissue render absorption less possible. Blood and lymph vessels are compressed and undergo atrophy. The tonsil becomes harder and smaller and infections become less. It is well known that with increas-

ing age the tendency towards the commoner tonsillar inflammations lessens.

20. The so-called acute tonsillitis, inflammation of the lining of the fossulae, lacunar tonsillitis, impaction of the fossulae with debris and bacteria, chronic follicular tonsillitis, are not diseases of the tonsil. They affect only the *outside surface* of the organ.

21. Membranous affections limited to the tonsil cause little or no adenitis, or constitutional symptoms. There is, therefore, no absorption from the surface of the organ.

22. Primary disease of the tonsil is disease that begins at or in the tonsil.

23. We have assurance that disease of the tonsil is primary when the pharynx, nares, and larynx are in normal condition.

24. Whenever any part of the pharynx, nares or larynx is affected, it then becomes especially difficult to determine whether the tonsil affection is primary.

25. When cervical adenitis occurs, we must not assume that absorption took place through the faucial tonsil. It has not been proved that the faucial tonsil absorbs. But all authorities agree that the thousands of lymphatic glands in the pharynx, nares, and larynx are very active absorbents. Therefore, whenever cervical adenitis occurs, we must make sure in every case that no absorption took place through some of these lymphatic bodies. To prove that in any given case, infection entered the general system through the faucial tonsil, it is necessary to prove that it *did not* enter through any of the other lymphatics of

the pharynx, nares or larynx, which latter are most absorbent when in *normal* condition. *Otherwise, there is no absolute proof that any infection entered by way of the faucial tonsil.*

If no disorder is visible in the lymphatic glands of the pharynx, nares and larynx, they are then in the best possible condition for active absorption.

(26) If the bacilli of tuberculosis and the cocci of rheumatism are to be found in the peritonsillar tissues, then we can have no assurance that *these* tissues did not absorb the respective micro-organisms of tuberculosis and of rheumatism.

(27) If the tonsils look natural in color and in size, then the adenitis, and the absorption of bacilli and cocci, most probably took place through the numerous lymphatic bodies of the pharynx and nares, and the tonsil cannot be held responsible; certainly not solely accountable.

(28) The faucial tonsil is rarely attacked by suppuration: there exist suppurative follicles, but the interstitial tissue itself does not suppurate.

Tonsillitis with suppuration means, in the vast majority of cases, *peritonsillitis*. It is the peritonsillar tissue which forms the abscess, and most frequently it is at the superior pole of the tonsillar loge where the pus is sought.

(29) It has been proved, both microscopically and macroscopically, that the tonsil is very often only in part affected, not the whole organ.

Secondary.

Any disease of the tonsil arising from disease in another locality, either by continuity of surface, or by direct communication via the lymph or blood vessels, is secondary to the latter affection. *The great majority of tonsillar diseases are secondary affections.*

The tonsil may be secondarily infected by microbic penetration of its surface. For example, in peritonsillar abscess the micro-organisms invade the tissue surrounding the tonsil, causing an inflammation which leads to penetration. It is less known that this not only occurs on the faucial tonsil, but on all other tonsils.

On the base of the tongue, inflammations occur which affect the epiglottis, taking their origin from angina of the lingual tonsil. This is not rare. Angina of the pharyngeal tonsil has caused abscess in the naso-pharynx.

The tonsil may be secondarily infected from the blood, the lymphatic vessels carrying infected material to the inside of the tonsil. It is important to know that the tonsils *can be infected via the blood and lymphatic vessels* just as from the surface. Secondary infection from its surface is the same as in other parts of the body. Infection from the blood has not been sufficiently considered. *Frederici and Goerke have given experimental proofs of the infection of the tonsil from the blood.*

Secondary infection of an organ means nothing else but that germs circulating in the blood or lymph current find conditions in this organ favorable to their settlement.

Lately, experiments have been published by *Von Lénárt* which proved the statement of *Fränkel* that secondary infection of the faucial tonsil follows operations in the nose. *Von Lé-nárt* has proved that the lining of the nose is directly connected by lymphatic vessels with the center of the tonsils. *We are sure infectious material is carried to the tonsil from the nose.*

Very commonly in my daily practice, in many cases, I have observed swollen, tender and painful faucial tonsils, following an attack of acute coryza. And I have demonstrated to many physicians, in many cases of exacerbation of chronic nasal catarrh, the immediate improvement and the prompt subsidence of the tonsillar condition after cleansing and sterilizing the nares.

While the tonsils are infected mostly from the nose, via the lymphatic vessels, they are also infected via the blood and lymphatic vessels with tuberculosis. These latter cases belong mostly to the latent tuberculosis. The children are comparatively healthy. They are only troubled by the hyperplasia of the tonsils, either in the pharynx or in the throat. In the tissue of the amputated tonsil we find tubercular nodules or bacilli; we often find also in children swelling of the glands of the throat. These children appear scrofulous and we can assume that the swelling of the glands is caused by resorption of the nodules of tubercular bacilli in the tonsils. If we make tuberculin injections in children, we can often show a local reaction in the pharyngeal tonsil. If these children show a general reaction, nothing is proved, as they might have

tuberculosis in other parts of the body, but if one sees in such cases that the tonsils show a local reaction one can make the latent tuberculosis a manifest one.

There is a primary lupus of the pharynx as also a primary miliary tuberculosis, but in most cases these are secondary. I believe it sufficient if you consider these forms, the latent one, the visible tuberculosis which is seen sometimes as miliary tuberculosis and at other times as *lupus*.

Symptomatic.

As a matter of diagnostic convenience, the tonsillar manifestations of constitutional diseases, such as general tuberculosis, and of scarlet fever, measles, etc., may be termed *symptomatic*, in contra-distinction to secondary affections that may be rather *directly traced to another locality*. There should be little trouble, generally, in the recognition of symptomatic conditions.

Reflex.

The subject of tonsil reflex is very complex and very obscure. The faucial tonsil is well situated and admirably equipped for reflex effects, through its connection with the fifth, ninth and sympathetic nerves.

Reflex processes involve not alone the sympathetic nervous system, but they include as well the motor and sensitive nerves; and their problems are proportionately intricate.

The remarks of *Jonathan Wright*, in his work on the "*Nose and Throat in Medical History*," on the subject of reflex nasal neuroses, may be per-

fectly well applied to reflex tonsil neuroses: "How grossly, after a few years, this subject was exaggerated and distorted is apparent, now that the exaggeration is decreasing."

And *Lermoyez*, in an article on "*Accidents Which Follow Nasal Operations*," states: "Tardy, but fatal, the reaction has set in against the excessive operations which have followed an exaggerated generalization of the discoveries of *Voltolini* and of *Hack*. In the concert of precocious enthusiasm, some discordant voices had much difficulty in making themselves heard. Times have changed. Now, silence has come."

Fränkel, inaugurating the laryngological section of the *Congress at Berlin*, said: "The study of nasal reflexes seems for some time past a little neglected by the specialists. The thing is not regrettable; it concerns the future of this specialty that it proceeds with calmness and avoids every dangerous impetuosity. We will thus assure the good of patients, and above all, the confidence of the great medical public in our specialty."

Charles P. Grayson, in the *Medical Record*, December 12, 1908, states: "I am very much of the opinion that before any further addition is made to the list (of reflex disturbances for which the nose has been held responsible) the foundation upon which it rests should be critically examined to see if it be secure enough even to support the strain to which it has already been subjected."

Sir Felix Semon, in his work on "*Diseases of the Upper Air Passages*," says: "We come to the subject of 'nasal reflex neuroses'; in my humble opinion one of the most unsatisfactory in

modern medicine. In my experience, our knowledge with regard to diagnosis and our results with regard to treatment of nasal reflex neuroses are still extremely unsatisfactory."

The words of Wright, Lermoyez, Fränkel, Grayson and Semon apply with equal force to the tonsils. In fact, they apply to these organs with more than equal force, providing that the cavernous condition favors, and the congestion of the erectile tissue of the nasal mucosa depends upon reflex action. Without cavernous and erectile tissue, there would probably be less vaso-motor excitement, and consequently less action of reflex character.

The faucial tonsils may suffer from reflex neuroses.

Affection of the faucial tonsil, as a result of reflex from a distant part, is a new study. Not one case of the kind has ever been reported. The subject is not mentioned in any work on physiology, nor in the textbooks of Wright, Knight, Ballenger, Escat, Moure, Coakley, Grayson, Kyle, Bosworth, Browne, Chiari, Castex, Frederici, Gruenwald, Mackenzie, Seiler, Sajous, Shurly, Williams, Burnett, Cohen, Ingals, nor by any other writer, as far as I have been able to ascertain.

The subject has been wholly neglected, but is bound to become more vital with time. Skilled diagnosticians will regard the matter with increasing importance, in view of the teachings (1) of Fränkel, Briege, Goerke, and others, that the tonsils are important protective organs; (2) that according to Von Lénárt, Poli, Frederici,

Fränkel, Von Levinstein and others, they are frequently affected in a secondary way, from nasal trauma; (3) of the teachings of *Miller, Van Baggen, Moure, Lamperti* and others, that they have mechanical functions; and (4) that *on the other hand, their complete removal is advised as an ordinary routine by most American operators.*

It is no doubt true that every natural anatomical structure in the throat, every muscular fibre, every nerve filament, every lymphatic gland, has a physiological function.

The very latest advances in pathology and in biological chemistry must be drawn upon, *for there is exceedingly great danger of confounding secondary diseases with reflex trouble.* An exact differential diagnosis must be made, a positive line of demarcation must be drawn between those diseases which are supposed to be reflex, and those which *Fränkel, Von Lénárt* and other investigators have proved to be due to secondary absorption from nasal trauma.

By the law of reflex action, reflexes must be capable of extending in either direction, with equal ease and facility. If a lesion of the faucial tonsil is capable of provoking reflex disturbance in a distant part, then the tonsil must be subject to reflex influence from the identical distant part.

The trifacial and glosso-pharyngeal nerves are extremely sensitive. They both send branches to the faucial tonsil. So does the sympathetic nerve. Any affection of these nerves may, by the law of reflex, provoke disturbance of the faucial tonsil. The trifacial is the sensory nerve

of the mucous membrane of the nose and of its accessory cavities; and it sends sensory branches to the organ of hearing. The trigeminal is responsible for the radiation to the ears of pains, which have their origin in the naso-pharynx, the pillars of the fauces, the lateral walls of the pharynx, the tongue and the faucial tonsils.

The faucial tonsil is sometimes affected as a reflex from a distant part. The author has frequently noted cases of pain, vasomotor disturbance, acute swelling and hyperplasia, which appeared to be of reflex origin. Some of the so-called "rheumatic tonsils" appear more like reflex vasomotor disturbance; and some of those cases called "rheumatic" are certainly instances of *secondary disturbance* from the absorption of the morbid material of nasal catarrh.

"Pain in any part, when not associated with increase of temperature, must be looked upon as sympathetic pain, caused by an exalted sensitivity of the nerves of the part, and it is to be regarded as a pain depending upon a cause situated remotely from the part where it is felt." (John Hilton, "*Rest and Pain.*")

It is not uncommon to see the faucial tonsil congested and painful without apparent cause. There is no reason why pain may not occur as a symptom of hysteria. In a number of cases the author has observed a painful condition of the faucial tonsil associated as a reflex with painful affection of the nares. And in one case during the progress of necrosis in a molar tooth, at each and every exacerbation of trouble in the tooth, pain developed in the tonsil; and every time,

after the tooth had been treated, the pain in the tonsil subsided, until finally, after the tooth was cured, the pain in the tonsil permanently ceased. It is a common experience for the jaw to become stiffened with all the muscles of the pharynx firmly set, and pressing on the tonsil, pushing it out of its natural position, and causing pain in it, as well as in the whole region of the condyle—as a reflex condition from bad teeth.

Reflex spasm and congestion are sometimes the measures of nature to protect injured parts. I have seen this especially in cancer.

It is a common experience for pain to shoot into the ear when the faucial tonsil is touched with a probe, painted with iodine, or touched with an electric point. Pain produced by carious teeth is often felt in the tonsil, temple, or the ear.

But, in every case of suspected tonsil reflex neurosis, whether from, or to, the organ, until proved, should be viewed with doubt.

Reflex neuroses, as manifestations of hysteria, are of very common occurrence. Almost every disease may be simulated by hysteria. Anaesthesia, complete loss of hearing, smell and taste, may occur due to hysteria. The mucous membrane of the nose, mouth and larynx become analgesic from the same cause. The muscles affecting the voice may be affected in hysteria, causing complete loss of voice.

The hysterical barking cough is a good example of reflex. Hysterical cough, by the irritation which it produces, will sometimes cause organic disease of the throat.

Hysterical aphonia without paresis, without

inflammation, without any apparent laryngeal irritation, is not uncommon.

I was consulted recently by a contralto whose glorious singing voice was entirely lost through fear of repeated criticism. The whole respiratory tract was absolutely normal. It was a case of pure psychic reflex.

Contraction of the wound after removal of the tonsils is sometimes very great, and extensive adhesions often form, leading to distortion of the parts and over stretching of the mucous membranes, and providing endless reflex actions.

Sahli, "*Diagnostic Methods*," 1906, states: "*Pain may be subdivided into parenchymatous and neuralgic. In parenchymatous pains* the sensory fibres are irritated at their terminal ramifications, in *neuralgic pains*, at the trunks of the sensory or mixed nerves, in the sensory roots or in the sensory centers."

"In the *former*, the termination of the sensory fibres are irritated quite independently of their organ, and therefore the pains overlap the boundaries of peripheral sensory areas, apparently at will."

"*Neuralgic pains*, on the contrary, according to the law of eccentric projection, are localized in areas that correspond exactly to the peripheral distribution of the nerve trunk or nerve involved. Pain may, however, be felt in neighboring nerve territories from irradiation of the pain from the involved nerve into them."

"*Neuralgic pains* are generally much more severe than , for the reason that in the former a much larger number of fibres

are painfully irritated, and ordinarily at the same moment. Probably for the same reason remissions in a severe pain are more decided in *neuralgic* than in *parenchymatous pain*. Another distinction is that generally with *parenchymatous pains* the entire painful area is sensitive to pressure. This is sometimes the case with neuralgic pains; but, as a rule, only that portion of the nerve trunk is sensitive to pressure which lies superficial or upon a hard foundation (neuralgic pressure points)."

"So-called *sympathetic* or *reflex* sensation is related to hyperalgesia. The best known of this is pain irradiation, in which the pain is perceived far beyond the limits of the painfully irritated peripheral part (pain in the entire trigeminal distribution, occasioned by a single carious tooth). This phenomenon can be explained only by assuming that the painful stimulation in the central organs overlaps or irradiates to neighboring tracts by means of dendrites and collaterals, and that, in accordance with the law of eccentric projection, confusion as to the origin of the perception results."

"The pain sense is not always concerned in reflexes either of primary or *secondary* nature."

"*In testing reflexes*, it is advisable to distract the patient's attention as much as possible from the parts under examination. The simplest device is to direct him to close his eyes. *The fatigue of a reflex is sometimes responsible for mistakes in diagnosis. It is a safe rule to observe each reflex quickly and accurately, and to utilize repeated, careful examinations in order to*

discriminate in any doubtful case, for the reflexes, like other nervous functions, often vary at different times."

"Ordinarily reflexes are local in character, *id est*, they take place in the region of the body that is irritated. *But with an increase in the reflex irritability, which may be partly within the normal physiologic limits and depend partly upon reflex stasis, the reflexes may be diffused in cross and longitudinal directions to other muscle areas and to other extremities.* This corresponds to *Pflüger's laws of reflex dispersion.* Increase of the reflexes, as well as decrease or absence and qualitative abnormalities, are (*the so-called pathologic reflexes*) of considerable importance for diagnosis."

"Formerly it was believed that the spinal cord was the center of all reflexes. Modern neuro-pathologists, however, following the teaching of *Bastian*, endeavor to dethrone the cord from its position as a reflex organ."

"According to *Jendrassik*, there are spinal and cerebral reflexes, as well as a combination of the two, *id est*, reflexes requiring both cerebral and spinal centers for their normal performances."

(1) "**SPINAL REFLEXES.** This division includes tendons, periosteal and joint reflexes. Their characteristics are as follows: (a) They are generally discharged from parts which possess little sensation. (b) The reflex is associated with no particular feeling. (c) The discharge takes place by means of a simple mechanical irritation, such as a blow. (d) The intensity of the reflex depends upon the intensity

of the irritation, not upon its duration. (e) The reflexes are quite as easily excited in ourselves as in others. (f) The latent time of the reflex, corresponding to its origin in the spinal cord, is the shortest. (g) The ensuing movement is a very simple one and serves a recognizable purpose. (h) Making other muscles tense increases the reflex. (i) Slowing of these reflexes never occurs pathologically. (j) Psychical influences have no effect upon these reflexes aside from distraction of attention; which increases them."

(2) "**CEREBRAL REFLEXES.**" These are to a large extent the *cutaneous reflexes*. The palatal and conjunctival reflexes belong to this group. Their characteristics are as follows: (a) They are discharged from sensitive spots which are not ordinarily accustomed to a light touch (tickling). (b) The liberation is associated with a specific sensation (prickings, cold, tickling, etc.). (c) Brief stimulation is efficacious for their liberation. (d) A light touch has often a more vigorous action than a stronger one; individuality has a decided influence. (e) These reflexes can scarcely ever be liberated by the person himself, and then only very slightly. (f) The latent time is longer and not as constant as with the spinal reflexes. It is quite independent upon the sensation time and corresponds to the reaction time, *id est*, the time which the voluntary reaction demands of a sensory stimulation. (g) The resulting movement is simple, and its principal characteristic is that it shows an effort to escape from the irritation. (h) Increased activity of other muscles never increases the reflex,

but may even diminish it. (i) These reflexes are diminished on the paralyzed side in cerebral hemiplegia. (j) They are delayed in cases of delayed sensation. (k) Psychical influences can either diminish or even increase these reflexes; distraction of the attention impairs them."

"(3) *COMPLEX REFLEXES.* To this group belong reflexes which have complicated centers, within which the reflex occurs, not as a single movement, but as a series of such, as *sneezing*, *vomiting*, *swallowing*, *coughing*, etc. The characteristics in common are as follows: (a) They are liberated from sensitive places. (b) The liberation takes place with a specific sensation, which plays even a greater role in the origin of the reflex than in those of the cerebral group. (c) The liberation requires protracted stimulation. (d) Individuality has a great influence upon the occurrence of the reflexes. (e) The stimulation which produces these reflexes is a specific and complicated one. (f) The latent time is longer than for any of the other reflexes. (g) The resulting movement is very complicated and bilateral: small muscle groups take part, and in some of them the reflexes act antagonistically. (h) Muscular activity produces a certain enfeebling in their action. (i) Psychical influences produce a great effect. (j) Reflexes of this group belong to the vegetative functions."

"The distinction between groups 3 and 2 is essentially this: in the latter the sensation is transposed directly into simple reflex movement; whereas in the former the sensation, i.e.: the cortical stimulation first of all excites a complicated

reflex center to activity. This center is composed of different separate centers, and within the main center the reflex process then takes an independent course."

"*The demonstration of the presence of a reflex is of greater diagnostic significance than the demonstration of its absence, because its presence is conclusive evidence of an intact reflex arc; whereas, although its absence may mean that the arc is interrupted, it may also mean that the reflex is affected by a nerve inhibition or by remote influence from some circulating disturbance. Similarly, an increase of a reflex is ambiguous. The latter may be caused by lesions which directly stimulate the reflex centers or tracts, or by those which remove inhibition or injure inhibitory fibres. The pathologic relations of the reflexes are, therefore, evidently complicated.*"

We know so little about the vasomotor relations in nervous diseases that it is scarcely worth while to enter upon a general discussion.

While it is a common assertion that cicatrices, deformities, and altered secretions, *provoke* reflex lesions; on the other hand, there is evidence to show that abnormal conditions at times *prevent* by reflex action the development of distant neuroses. *MacDonald* has recorded a case of complete nasal obstruction for ten or twelve years, in which severe bronchial asthma developed six weeks after the restoration of free nasal breathing. Circumstances, which one might ordinarily judge would provoke reflex actions, many times do not. Instance, for example, the two following remarkable cases. *Krause* reports the

case of a tenor whose glottal lips looked like two ridges of red flesh, and whose tones appeared nevertheless unusually sweet and soft. And *Imhofer* observed a singer with hypertrophy of one of the ventricular bands so that the glottal lip appeared as only a small edge beneath the heavy mass of the ventricular band resting upon it; with this apparently unavailable larynx, he is a successful tenor on one of the largest *German* stages.

The natural reflex action of the normal faucial tonsil may be impaired by operative interference.

In the investigation of tonsil reflexes it is a safe rule to take nothing for granted. Demand proof for everything.

"How greatly would the number of operations on the tonsils diminish if only those which necessity imposed were performed, and above all, if in the treatment of the nervous accidents called *reflexes*, one addressed himself to the *primary* cause of all the trouble, to *neurasthenia, dyspepsia, etc., and not to the tonsil lesion, which most frequently is only between the cause and the effect merely a negligible intermediary.*" (*Lermoyez.*)

Before permitting the faucial tonsil to be removed, absolute clinical proof should be demanded that the disease from which it suffers is not reflex nor secondary. And on the other hand, clinical proof should be demanded for all alleged reflexes from the tonsil, namely: that they can only be produced as reflex neuroses from the faucial tonsil; that they may be completely arrested by anaesthesia of the tonsil; and that they can only be cured by direct treatment of the ton-

sil. These points must be insisted upon in all doubtful cases.

MECHANICAL. By reference to that part of my chapter on physiology which treats of the mechanical functions of the faucial tonsil, I will save repetition here of matter which bears upon the diagnosis of its mechanical diseases.

In my chapter on physiology, I have dwelt at great length on the mechanical affections of the faucial tonsil to show the great difficulties that lie in the way of correct diagnosis. But the intelligent interpretation of all these affections of the tonsil and voice must be enforced, if we wish to preserve respect for our science.

Mechanical affections of the tonsil, associated with the mis-use of the voice, are beyond the ken of the medical profession.

Maladies, for example, of the timbre of the voice, of the middle register, of solidity, intensity, compass, agility, the tremolo, etc., do not belong to the consideration of physicians.

Many years of experience as an expert laryngologist, and the careful examination of many thousands of patients with diseases of the nose, throat and lungs, enables me to endorse *Castex* when he states that:

"It often happens that we are consulted by professional voice users, in whom the examination of the larynx, and of the entire vocal apparatus, nasal fossae, pharynx, trachea, bronchia and lungs, does not reveal to us anything but small lesions and sometimes *nothing*. The various troubles of which these patients complain are not found in any known pathology. In some, 'the

medium is out of balance,' or the 'transition' is missed, or 'they no longer have any mezzo-tone,' etc. These are difficult cases for the laryngologist. There may be vocal trouble while the larynx remains immune. On the contrary, an excellent voice may be up to par with a larynx in bad condition. I have seen the cords thick, red, presenting all the symptoms of corditis, in artists in whom the voice gave no trouble. *Krause* and others have made the same observation."

"To disentangle voice maladies is not easy, in spite of the knowledge, zeal, and reflection that one may bring to it."

"The diagnosis of a malady of the voice is difficult. Every laryngologist has been a witness to the discouragement of singers, when their voice is in jeopardy. It is in such cases that a good professor of singing, or elocution, will indicate the causes. A rational method in singing, or speaking, counts for much."

"Patients submit for years at a time to cauterization of the nasal mucosae, resection of the horns or spurs, galvano-cautery of the pharynx, cauterization and massage of the larynx, removal of tonsils, etc. Then they complain that all the treatment has accomplished nothing. The doctor, in these cases, compromises the credit of laryngology."

"The treatment to pursue in vocal cases is not always evident."

In all matters pertaining to the voice, it must be distinctly understood that voice mechanicians, expert laryngologists, and experienced voice trainers, the teachers of singing and the teachers

of elocution, are the voice authorities; they are the men who know, the men who represent the voice profession. And it must be clearly recognized that in all matters pertaining to the voice, the ordinary throat specialists, the laryngologists, and the general medical profession represent nothing but the laity. *The medical profession is the laity to the voice-profession in matters of the voice.*

There are charlatans in the voice profession, as in every other profession, but cast them aside, and take the scholarly, conscientious, and experienced voice teachers, those trained to teach, for their knowledge of the voice and its affections.

It is beyond the knowledge, and absolutely out of the sphere of physicians to judge of maladies of the timbre of the voice, of affections of the middle register, of the solidity, intensity, compass, agility, etc., etc. Mechanical affections of the tonsils associated with the mis-use of the voice demand the knowledge, experience and skill of voice mechanicians and voice trainers.

"The student whose voice has been injured, either by mal-treatment of a charlatan, or unhygienic habits of living, must not attempt to cure himself, nor should he go to any but a teacher whose skill is unquestionable, for the slightest imperfection in the cure may ruin the voice permanently." (*Mme. Cappiani.*)

I wish to mention a peculiar mechanical condition which I have sometimes observed.

If a bolus of food, in its passage through the pharynx, receive any impetus at all from pressure of the faucial tonsil, then enucleation of the

tonsil plus the contraction of tissue due to cicatrization may interfere with the act of swallowing. Especially in elderly persons, in whom the act of swallowing is sometimes tedious, appearing like a condition almost of semi-paralysis, we may find an aggravated condition owing to enucleation at some previous time. These cases of *slow process in swallowing* are not so uncommon in old people.

In a case of this kind, slightly magnified by an acute swelling of the lingual tonsil, the attending physician made the diagnosis of "paralysis of the vocal cords," and "advised an immediate tracheotomy." I was then called into consultation; changed the diagnosis; and we promptly cured the patient of his lingual tonsillitis.

Escat (Technique Oto-Rhino-Laryngologique, 1911) says: "The various symptoms of isolated troubles in professional singers are quite varied: the greater part are impossible to classify, by reason not only of the difficulty of penetrating their mechanism, but even to define them, for empiricism, in spite of the very earnest researches of which vocal physiology has been the subject, reigns still as master in this pathology of singing: the bond of union still remains to be found between these two sciences, which have refused so far to permit themselves to be penetrated."

Hyperplastic.

To enable one to draw the differential lines of diagnosis in the scientific differentiation of tonsillar enlargement, it becomes a *sine qui non* that

we must accept a clear definition of what constitutes a normal tonsil.

The microscope will show the actual histologic structure of the tonsil. Having a normal histologic constitution, the *relative size* of the organ then comes into question: a large tonsil in a large mouth is normal: whether it is out of proportion depends upon whether it presses unduly upon neighboring tissues, or protrudes into the lumen of the fauces so as to interfere with deglutition or phonation, or with both. The organ may be histologically normal, *and yet be too small to properly perform its mechanical function in singing and speaking.*

Having a normal structure, it is necessary to determine with great care whether the enlargement is *temporary* or *permanent*. Temporary being due to some transient cause, as for example, an acute coryza, or a mis-use of the voice, giving rise to momentary increased functional or cellular demand—*mere swelling*, or *simple enlargement*.

Continued coryza, or continued abuse of the voice mechanism, will more permanently increase the size of the cellular structure, by reason of a sustained demand on functional action—the organ thus becomes *simply hypertrophied—cells are enlarged*. Simple hypertrophy is enlargement of normal specific structural elements, due to increased functional activity.

Increase in *size* of the structural cells is *hypertrophy*: increase in their *number* is *hyperplasia*. The same tonsil may be *both hypertrophic and hyperplastic*.

Hyperplasia of the tonsil is more often scrofulous than tubercular.

Sarcoma, carcinoma, and other forms of enlargement are to be diagnosticated by the microscope.

Many years in the practice of my profession have taught me to respect the opinions of others, the opinions of younger men, and particularly the opinions of those who are older and more experienced than myself. Knowledge is ripened by experience. *Henry Clay* "depended on nothing else so much as on experience." *Madame Bernhardt* with advancing years has materially changed her interpretation, softened the character and made more ethereal her impersonation, of the unfortunate *Camille*.

The very highest value is to be placed upon the knowledge obtained from the practical acquaintance of the many years of personal experience and repeated observations of authorities like *A. Jacobi*, *Castex*, *Lamperti* and *Mme. Cappiani*. *They know the past, and they look into the future.*

"In fearless youth we tempt the heights of arts;
While from the bounded level of our mind,
Short views we take, nor see the lengths behind;
But more advanced, behold with strange surprise
New distant scenes of endless science rise!"

"Modern 'pothecaries, taught the art
By doctors' bills to play the doctor's part,
Bold in the practice of mistaken rules,
Prescribe, apply, and call their masters fools."

(Pope's Essay on Criticism.)

There are *many* diseases of the faucial tonsil and *many* appropriate lines of treatment.

To cure the various diseases, and to preserve the important functions of this valuable organ, require the most accurate scientific discrimination between affections that are primary, secondary, symptomatic, reflex, mechanical, and hyperplastic. *Every case is important: valuable functions are involved. Every case must be scientifically differentiated; or the attendant may possibly be charged with ignorance and crime.*

CHAPTER XII

HYGIENE OF THE FAUCIAL TONSIL: HYGIENE OF THE VOICE.

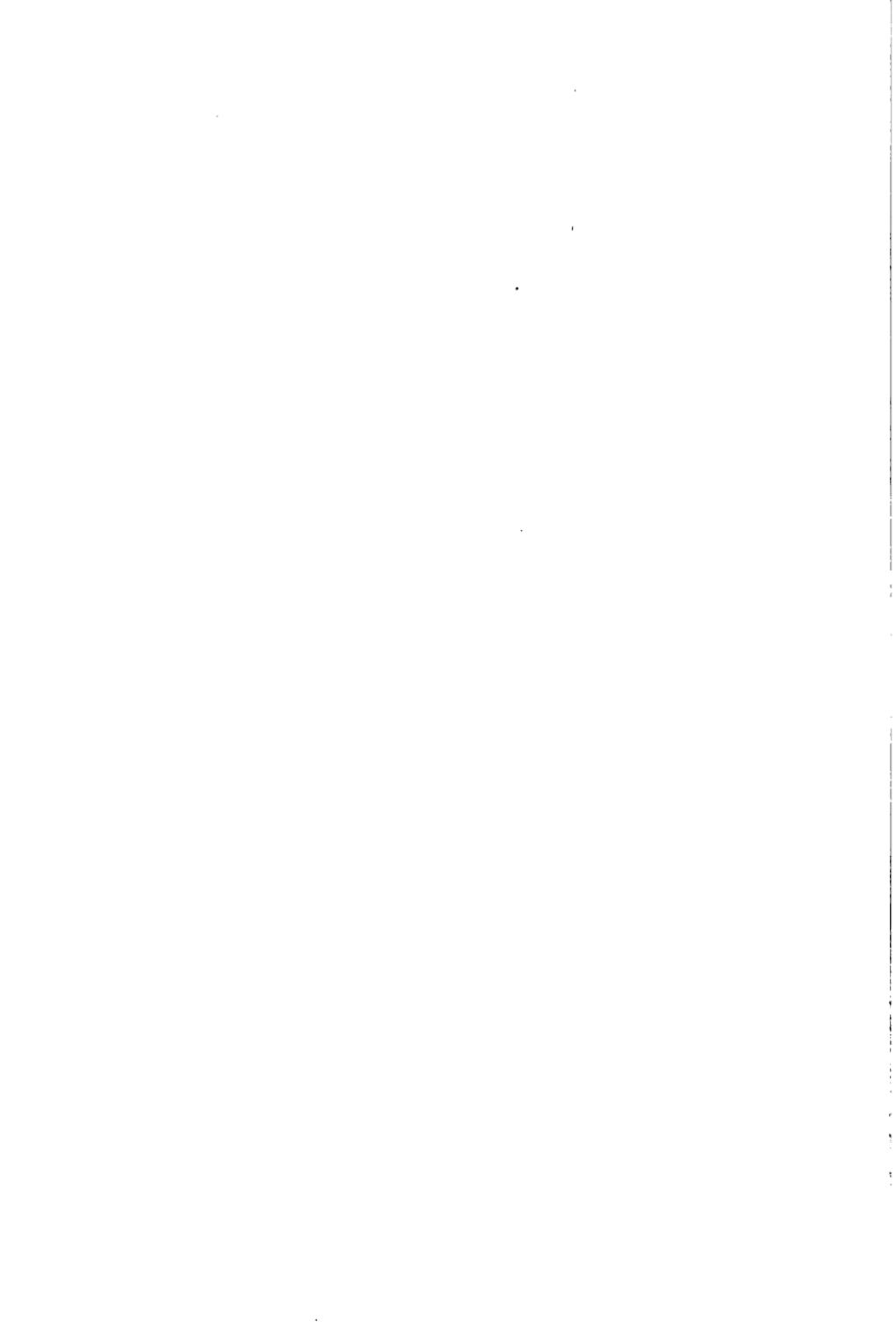
The hygiene of the tonsil, the preservation of the health of the organ, will be safeguarded by observing the various sources of trouble, and by the establishment of rules or *principles of hygiene* that will tend to systematize the knowledge of the different sources.

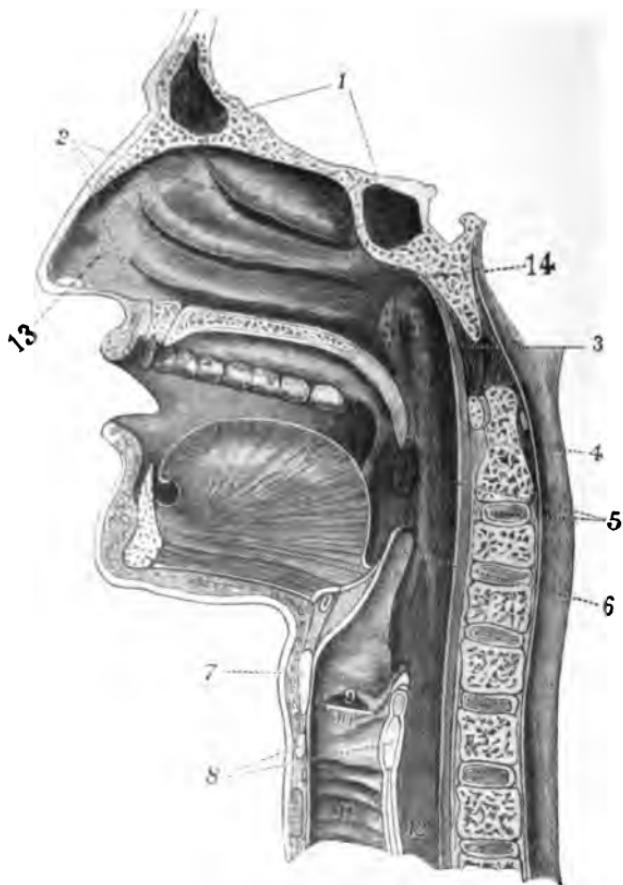
The chief sources of trouble arise in the *mouth*, *nose*, *general system*, *nervous system*, and from *mechanical causes*.

To protect the tonsil from disease in the *mouth*, the buccal secretions, as well as those of the fossulae or crypts of the tonsil, must be kept free as possible from inhaled dust containing micro-organisms and other noxious material, admixed with particles of decomposing food sometimes found about the teeth and gums, which irritate and inflame the *free surface* of the mucous membrane which *covers the tonsil* and also *acts as a lining* of the fossulae. The teeth and gums must be kept in good condition.

When necessary, the fossulae should be drained and aero-suction applied, or aero-electrotomy, to strengthen and make more resistant to irritation the lining of the fossulae and the covering membrane of the tonsil.

Dust, germs, decomposing food, and other noxious material, affect the *surface* of the tonsil, and the *surface* of the lining of the fossulae.





Vertical section of nose, pharynx and larynx.
Showing especially the location of the dust-traps.

1. Cavities in the bones of the head.
2. The nasal passages.
3. Orifice of Eustachian Tube leading to ear.
4. Uvula.
5. Pillars of the fauces with the tonsil between them.
6. Epiglottis.
7. Thyroid cartilage.
8. Cricoid cartilage.
9. Ventricle of larynx.
10. Vocal cord.
11. Trachea.
12. Esophagus.
13. Front dust-trap (nasal vestibule).
14. Rear dust-trap (post-nares).

To protect the tonsil from infection from the *nose*, by morbid material carried by the lymphatic vessels from the nose to the *inside* of the tonsil, in the manner as proved by *Von Lénárt*, and accepted by *Fränkel*, *Von Levinstein*, *Jacobi*, and others, *the nasal passages should be kept absolutely clean and constantly sterilized.*

The effect of the transmission of noxious material from the nose to the *inside* of the tonsil is to render the organ tender, painful and swollen—it seldom causes inflammation or suppuration.

The nose is a much abused and greatly neglected organ. Persons of intelligence and refinement, fastidious in taste, and immaculate in dress, are, nevertheless, ignorant of the *transcendent importance of the necessity of a toilet of the nose*, a subject on which no treatise has yet appeared.

The nose is the commencement of the respiratory tract. The air we breathe should enter through the nose, not through the mouth. It is warmed and moistened in the nasal passages. The volume of air required daily for each person, in ordinary natural respiration, is 10,000 litres. Thirty cubic inches of air are inhaled with every ordinary inspiration; there are eighteen respirations every minute, and 1,080 respirations every hour; 540 cubic inches of air are inhaled every minute, and 32,400 cubic inches every hour. And all this goes, or should go, *in through the nose.*

Air carries into the nose many impurities—dust, smoke, germs and other noxious material. Germs are floating in the air, everywhere, in large quantities. Whenever dust is raised, in the

street, in factories, in schools, in hospitals and in other places, we inhale with the cloud a large number of microbes.

It is stated by *Von Schrötter* (*Hygiene of the Lung*) that "In the parks of Berlin, the air contains always from 100 to 1,000 germs per cubic metre. There are as many as 800 per cubic metre on top of the tower of the Rathaus, while the air of an inhabited room contains from 6,000 to 10,000 per cubic metre."

"In one gramme of dust from the floor-covering of one of our chief public institutes, 6,600,000 to 21,000,000 bacteria were estimated in a scientific investigation."

Dust is collected in the vestibule of the nose as in a trap, and the deflection of the current of air in the back of the nose, at the sharp angle of the fauces, acts as another dust-trap.

It is now apparent that the nasal passages should be kept open and clean.

The nasal *vestibule* being the *port of entry* demands scrupulous attention; it should be zealously guarded against the invasion of dust and germs. *Protection of the vestibule* will prevent penetration of the deeper passages. *Nothing must be permitted to go beyond the vestibule.* Accumulations should be carefully and gently mopped out, not washed farther in by sprays or douches. *Don't spray. Don't douche.*

The nasal vestibule should be gently and thoroughly mopped morning and evening as a finishing touch to the toilet, with a wad of absorbent cotton saturated with a solution of powdered

borax, 68 grains, warm water, one pint, and essence of peppermint, 20 minims.

Don't pluck the hair from the nose. It prevents the entrance of dust. Never blow the nose violently. Whenever the nasal passages are congested or uncomfortable from an acute cold, apply heat to the bridge of the nose by a sponge or towel wrung out of hot water, or by a thermic electric ray.

To protect the tonsil from trouble arising from the *general system, constitutional* treatment is required.

To protect the tonsil from affections of the *nervous system*, occurring as a matter of reflex, the original trouble must be sought for and abated.

In recurrent tonsillar trouble, from any cause, the general system should be hardened by systematic exercises, fresh air, habits of cleanliness, wholesome food, good digestion, regulated bowels, ventilated and sanitary sleeping apartments, proper sleeping hours, etc.

HYGIENE OF THE VOICE.

D. Ffrangcon-Davies in his admirable work (*The Singing of the Future*) says:

"A purely scientific or a mathematical brain would not make much of the singer's art. The whole spiritual system, spirit, mind, sense—*soul*, together with the whole muscular system from feet to head, will be in the wise man's singing, *and the whole man will be in the tone.*"

Frank E. Miller says: "It is more difficult to keep the keen edge of the voice in good repair than that of the sharpest razor. No one more than the singer requires to observe the moral and physical laws."

Inquiry among the greatest artists has elicited the fact that they are scrupulously careful of their health.

Madame Adelina Patti, now the *Baroness Cedarstrom*, in a personal communication to the author, has stated that

"I have never had any trouble with my throat or voice during my entire career as a vocal artiste."

Madame Nordica communicated to me the statement that

"I have never had my throat touched, or sprayed, in my life."

Madame Homer, in her personal communication, said:

"I remember with pleasure your kind and most helpful treatment. I have never heard of a singer who had their tonsils removed. I have the greatest prejudice against it."

Miss Cecelia Winter told me that

"It is a well-known fact among singers that those voices are strongest and best where the throat has not been tampered with by surgeons."

Many young voices are ruined for want of care.

Castex, one of the greatest authorities on the maladies of the voice and voice hygiene, in his work entitled "*Hygiène de la Voix Parlée et Chantée*," states:

"The singing and speaking voices differ from each other in three principal qualities of sound. The compass is smaller in the speaking voice, the intensity is less, and the timbre greatly different."

"Actors have found it well to learn to sing, in order to make the voice carry and last. *Garcia* several times had occasion to give lessons in singing to military officers, who wished to have their voices carry well when issuing commands, without causing fatigue."

"In a general way, speech fatigues the phonator organs more than does singing."

"A voice in its decline finds itself more at ease in tragedy than in comedy roles, which exact a much greater flexibility."

"In a general way to conserve the voice, it should be kept in the medium tones of the organ."

"A methodical and rational elocution is the best guarantee against the various affections which may attack the vocal apparatus of an orator."

"Granular pharyngitis is more frequent in preachers and lawyers, who are more pre-occupied with the substance than with the form, than

among actors closely attached to the form of the elocution."

"To put himself in proper form the orator should apply himself to various exercises as follows:

"(1) Extend his voice in the low as well as the high registers."

"(2) Emitting clearly, one after the other, each note of his vocal compass in working successively on each vowel, then associating consonants with vowels, for the clearness of the articulation of the consonants will supplement the insufficiency of the voice."

"(3) Establish his habitual voice at a height, a medium diapason, an intensity and a medium on which he can speak without fatigue. He should exercise each day."

"(4) Exercise making sudden variations of tone. Nothing is more useful in arresting the attention of the hearer."

"(5) Study the times and the modes of respiration."

"(6) Attack clearly the sound by a stroke of the glottis."

"(7) Do not lose breath before the emission of the sound."

"(8) Exercises in agility are good for the speaker."

"(9) To 'place' his voice at the level of his lips."

"(10) Make his voice resound at its best, in well disposing the resonators."

"(11) It is necessary to 'complete, equalize, and tune the instrument': to lead it successively

in the various registers, to arrive at that variety of timbre which is at once a charm for the auditor and a repose for the reader."

"(12) Habituate himself to proportion his voice to the locality in which he speaks, to the end that his voice may 'carry' at its best in the various places. Singing lessons are very useful to the orator, as lessons in diction are to the singer. There is here a supplementary education which is not to be despised by either. Finally, if the orator wishes to use his voice at its best, he should know how to *write for the voice*, that is to say, how to compose his discourses in short and sonorous phrases. The orator should watch over his general health, and that of his lungs, bronchi, trachea, larynx, pharynx, mouth and nose."

"He must exercise then in a rational way. He must have a good technic."

"If he shouts, his voice will not carry. He should speak slowly at the start."

"If an orator is compelled to begin speaking when his voice is veiled, then let him begin just as it is, without trying to clear it by coughing or forcing it. 'Start from where you are.' Little by little, the voice will warm up, and if it does not become entirely clear, at least it has not become extinct. Even a hoarseness may disappear on condition of having commenced 'piano.'

"The antique mask of the tragedians and comedians seemed to have had, among other usages, that of reinforcing the voice by means of a resonating plaque of some kind."

"The *singing voice* has its own conditions very

distinct from those which we have recognized in the speaking voice."

"The singer should take care to breathe well, fully but silently."

"For the proper conservation of the voice, it is important not to overwork it and to manage it with ease and without violence, especially when the artist finds himself charged with a heavy vocal service."

"These precautions assure the conservation of a voice, not only during the evening but as well during an entire artistic career."

"All pure exercises of art must conform to physiology. Every defective method brings on a harmful congestion of the larynx."

"The voice runs great danger in being used when hoarse. Nothing is more pernicious than to sing with a cold."

"A particularly fatiguing thing to artists is the necessity of singing, alternately, rôles of different pitch."

"We should conserve especially those voices which are naturally beautiful. They are more fragile than voices somewhat manufactured."

"The face and all the exterior of the singer, should not betray the effort; no grimaces, no wrinkling of the forehead, no swelling of the veins of the neck. Exterior constraint leads to troublesome contraction of the internal organs.
It is necessary to sing calmly."

"When singing becomes painful and is accompanied with a sensation of local fatigue, of embarrassing tension, of spasm, it is necessary to stop. It is singer's cramp which is announcing it-

self. It occurs particularly when one has sung a piece which is too high, with too great a range for the natural compass of the voice."

"The duration of voice exercise is of great importance. To avoid tiring the voice, the exercise should be limited to one hour of work a day, divided into four periods of a quarter of an hour each. And rests should be taken in these quarter hour periods."

"Fatigue, or professional affections of the pharynx, sometimes determine an alteration of the timbre, which is erroneously sought for in the larynx."

"Artists should make sure of one or two months' vacation each year, during which they should leave their voices in almost complete repose. This is also a good method to assure the duration of the voice."

"Artists should consider the capabilities of the human larynx, and avoid compositions not suitable for the voice."

"After having acquired its development, the voice has need of regular exercise. Sing with medium force. Avoid 'bawling'."

"The happy effect of training upon the voice is appreciable, even in the course of a single day. Singers have made the remark that the voice of the 'morning' is fresh, but hard, and that the voice of the 'evening' on the contrary, though less clear, can be used for a longer time without fatigue."

"Above all, the singer should care for his general health, for the various states of this react ac-

cording to their nature, in good or harm for the voice."

"Little or no alcohol, nor dishes irritating to the throat (mustard, cayenne pepper, etc.). A complete toilet of the vocal apparatus is called for every morning."

"These cares are a natural preparation for that other toilet that *Faure* justly calls the 'toilet of the voice.' By this is meant, the morning exercises. Thanks to these various habits the singer will no longer be exposed to the inconvenience of having his voice 'dirty,' following the ordinary comparison."

"A mischievous habit is that of coughing before singing. This easily causes hoarseness and congestion."

"On the day of a performance the artist should avoid any particular fatigue of his larynx, and the general fatigue of his body; no fencing, no riding. Some even have the habit of going to bed a portion of the day. Women should spare their voices for two or three days at particular times of the month."

"Hygiene for singers is strict, who, to speak truly, are the subjects of an extremely sensitive organ."

"Do there exist certain recipes for putting the singer in voice? Some authors attach to this a certain importance."

"To-day when vocal hygiene tends to become more exacting and scientific, one cannot accord any particular virtue to the various recipes and I make no decision. It is for each one to use what his own experience shall have designated to him

as preferable. There are no rules to be established in that."

Castex (Maladies de la Voix, 1902) :

"Maladies of the voice, and maladies of the larynx are very different things, since a vocal trouble may have its cause in the nasal fossae or in the lungs, or even in the general health, while the larynx remains immune. If it relates, on the contrary, to a veritable affection of the larynx, as cancer or tuberculosis, the question of voice then becomes negligible. An excellent voice may be up to par with the larynx in bad condition. I have seen the cords thickened, red, presenting, in fact, all the symptoms of corditis, in artists in whom the voice gave no trouble. *Krause (Berlin)* and others have made the same observation. This distinguished professor is said to have treated a young tenor in whom the cords were transformed into two red fleshy cushions. The voice was soft and agreeable."

"It is the *diagnosis* of a malady of the voice, which is difficult."

"A rational method in singing, as in speaking, counts for much in the preservation of the vocal apparatus."

"It happens at times that a vocal trouble shows itself in the singing long before it appears in the speech."

"Alcohol is very damaging to the voice. It causes a constant congestion in the pharynx and the larynx, which finally results in chronic pharyngo-laryngitis. I have had voices lost by the use of alcohol."

Coffee, grog, punch, or champagne, give only

a transitory energy, soon followed by a vocal depression."

"Fatty aliments are favorable. On the whole, a mixed diet, animal and vegetable, agrees the best."

"Three hours should elapse as a medium between the repast and the exercise of singing."

"The artist should guard against dyspepsia. One may sing, having a great number of maladies, but it is no longer possible with an affection of the stomach, which interferes with the play of the diaphragm, and depresses the ensemble of the forces. Keep the mouth and teeth healthy."

"The entire nervous system, the brain above all, has an influence on the voice. Passions depress it. Emotions of gaiety, joy, render it facile. To quote *Mandl*, 'The voice is the mirror of the soul.'

"Smoking tobacco is detrimental to the voice. Cigarettes are particularly damaging, producing hoarseness. Especially bad for tenors and for those who begin to feel the first disabilities of age."

"Wear wool. No tight corsets. Don't wear neck wrappings. Dust and smoke are bad."

"*Vocal nodules.* They arise from vocal excesses, overwork or bad management of the voice. They may develop rapidly, or insidiously."

"Treatment consists in complete vocal repose for several weeks. The nodules may disappear by this means alone. Avoid forcing of the tones: Keep the voice in the middle register, and do not allow it to wander into the high: change teachers if there is reason to do so."

"As a general rule, one must be exceedingly cautious in operations on the larynx of artists, for vocal repose and less offensive means often suffice to put them in good order."

"Resumé. The physical alterations of the structures of the larynx, united under the term laryngitis, whether they proceed from a veritable malady, or from fatigue, generally attack the *timbre*."

"The abuse of speech, ill advised enthusiasms, or a too rapid education, compromise chiefly the *solidity*."

"Vocal excesses, or exaggerated efforts may diminish the *compass*."

"In trouble in the agility, a latent laryngeal tuberculosis may be suspected."

"If the *medium* is affected, look first to the chest (pulmonary bellows)."

"Troubles of *clearness* (cats, graillons, phlegm, etc.) coincide ordinarily with a catarrhal state of the chief respiratory passages."

"Troubles of *resonance* are almost always of nasal origin."

"When the *intensity* weakens, search at first for the cause in a weakening somewhere, of the general condition."

"For *nervous troubles*, it goes without saying, that they arise from the neuropathic temperament of the subject."

"This parallel has served me often. It is why I reproduce it here, not without saying that a detailed investigation for each patient, is the necessary complement."

Garcia (Hints on Singing) asks the question:

"To what would you ascribe the fatigue of the vocal organs?"

"Answer. Besides the different ailments of the vocal organs, which concern the physician, there are other causes, such as misdirected study or overwork."

"Question. Are there any other symptoms?"

"Answer. Hoarseness, relaxed throat, languor of the organ, which refuses to execute passages generally possible; dryness or heat in the throat, difficulty in swallowing, fatigue after a few minutes exercise."

Mme. Cappiani (Practical Hints and Helps for Perfection in Singing) says:

"An earnest student adopts a sensible, systematic plan of living and studying in order to obtain the best results. I would suggest:

"(1) A moral life, plenty of sleep and fresh air."

"(2) Eating at regular hours, food that is easily digested."

"(3) Avoid alcoholic drinks."

"(4) Hearing concerts and operas during the daytime when possible, in order to avoid late hours."

"(5) Between lessons, practicing along systematically, twenty minutes at a time, then taking a half hour's rest which can be employed to advantage in doing other work, such as: studying languages, pianoforte, musical history, physical culture, dancing, fencing, designing, painting, etc."

"(6) Wearing suitable clothes for changes of temperature to guard against colds."

"(7) Avoiding invitations that involve too many social duties, calls, etc., which waste time better employed in outdoor exercise."

"Do not be over sensitive in giving weight to gossip about your voice and skill. Have contempt for flattery. Have patience in your art. Be cheerful. Have faith in yourself; be earnest and diligent, and then with indomitable perseverance, you will succeed."

"What is good for the general health is good for the voice. All kinds of nuts, because of the oil they contain, should be avoided on the day of a public performance."

"Drinks, such as hot coffee and tea, or drinks that are too cold, taken just before singing, are injurious."

"Beware of eating ice cream before singing."

"No alcoholic drinks whatever should be used by young singers; they, at best, being harmful stimulants."

"On two occasions I had pupils, a tenor and a baritone, who were to sing. Both of them took champagne, expecting thereby to gain courage. The result was a rush of blood to the throat and neither was able to sing."

"For experienced singers, advanced in age, or for singers of anaemic constitution, half a glass of good, pure claret is serviceable as a stimulant."

"For further information on diet, I would advise all singers to take the counsel of a competent physician."

"Important Suggestions:

"Singing in open air is permissible only in a calm atmosphere."

"Singing or speaking in a carriage or in a rapidly moving train is very bad."

"To preserve his voice, a singer should never scream, laugh or speak unnecessarily loud."

"Stiff collars and tight ribbons, act like tight corsets on the throat and are dangerous fashions for the general health."

"Wearing corsets, so loose that one can put them on as they are taken off is rather an advantage as they protect the spine. A singer must be provided with corsets that allow the lowest ribs to expand."

"Those who cannot abstain from smoking should exercise in moderation and should never inhale the smoke. Swallowing the smoke and letting it out through the nostrils is very injurious."

Mme. Patti, whose marvelous voice was marvelously preserved, says:

"Dieting for the sake of the voice is nonsense. There must be moderation, of course, in all things, for the singer, above all other persons, must study intelligently her individual health conditions. She must learn how to keep herself well. The girl who is ambitious to sing need not deny herself anything she fancies at the table unless that particular thing happens to disagree with her, unless, indeed, she is to appear on the stage that same day. On the day of public performance it is necessary to eat very little."

"Soup is really the best food for singers, strong soup, well made. Rare beef is good, fruit and vegetables. Pastry and sweets are not good,

but are to be avoided more because they hurt the complexion than because they affect the voice especially."

"What wines may a young singer allow herself?"

"If she really means to succeed, no wines at all. I don't believe in wine. It hurts the throat almost invariably. Some young singers, I know, are not strong, and doctors prescribe claret for them, but it is bad practice to drink it. For myself, I never drink wine. I drink water, or, if I need a stimulant, I take water with a little whisky in it."

"If you were interested in a girl with a voice, would you have her go in for athletics to build herself up physically?"

"That would be ruinous policy. The girl who is going to rank as a singer must keep out of the gymnasium. She can't fence. She can't row. She can't ride horseback. I enjoy nothing more than horseback riding, and I ride well. I used to ride about Mount Vernon when I was only six years old. But I have given up all that entirely. I never ride now. It interfered with the firmness and evenness of the voice and gives a tremolo."

"Walking is the singer's exercise. The singer who has a good pair of legs must think herself highly fortunate. I can walk three or four hours at a good pace and I do so frequently. I believe in regular exercise, and the best way to take it is to drive, then leave the carriage for a while, but let it follow to pick you up if you find yourself getting tired."

"If I were interested in a student I would urge her to be careful as to what sort of air she breathes. It is very necessary to give attention to the ventilation of one's bedroom. It should not have a fire in it and the air should be frequently renewed. She should not associate too closely with tobacco users. Even the fumes of the weed are bad for the throat."

"How would you dress a young singer?"

"No directions are necessary except the hint that good voices have been spoiled before now by tight lacing. I believe in a well-made and properly-fitted corset, but it should not fit closely enough to impede free breathing and the proper expansion of the chest. Growing girls especially should be careful not to practice with lacings tightly drawn."

"Everything is summed up in the advice to take sensible care of one's self. The singer must go to bed early and not allow herself to get tired. She mustn't fret. Weariness and worry tell on the voice terribly. She must have as few outside cares as possible, and concentrate her efforts in a single direction, live for her art and live happily."

Mme. Lehmann (How to Sing) says:

"There are no magic cures for the singer."

"The repairing of a voice requires the greatest appreciation and circumspection on the part of the teacher."

"There are teachers and pupils who boast of having effected magic cures in a few hours or days."

"Of them I give warning! and equally of un-

principled physicians, who daub around in the larynx, burn it, cut it, and make everything worse instead of better."

Sir Charles Santley (The Art of Singing, 1908):

"I do not advocate smoking; those who find themselves perfectly well without, should leave well alone; those who find themselves perfectly well with it, ditto!"

"Hoarseness attacked me when there were flowers in the room, particularly the (to me) deadly gardenia, stephanotis, hyacinth, lily, etc."

"I was singing at a private party one evening, in which *Gardoni*, the tenor, a soprano, the daughter of *Varesi*, and others were engaged. I left home in splendid form, and was in the drawing room about half an hour before the concert commenced. I began to feel rather husky. When it came my turn to sing I almost collapsed, for I could scarcely produce a sound. *Mlle. Varesi* was in the same plight. *Gardoni* was husky and all the others were more or less incapacitated. The concert concluded, I was conducted into a room literally packed with 'harem lilies,' the deadly exhalations from which had penetrated the drawing room. I got away as soon as I could and had not been out of the house ten minutes before my voice was as clear and fresh as when I entered it. I have since had many proofs that my theory, as far as my own throat is concerned, is correct. I would advise all singers to be on their guard against scented flowers."

John Howard (Physiology of Artistic Singing):

"Spirituous liquors inflame all mucous membranes and their influence upon a tone is unmistakable. Malt liquors appear to be most harmful."

Miller (The Voice) says:

"Personal cleanliness is one of the first requisites. Bathing regular—not extreme."

"Singers should avoid beef, lamb and mutton. White meat of the fowl is the best meat for the vocalist. Milk, eggs, toasted bread, string beans, spinach, lettuce, rice and barley are excellent. Fruit stewed—with little sugar. Ice cream is bad. No harm in a cup of coffee, cocoa, or tea, for the singer in good condition. Smoking is injurious. Silk underwear is dangerous. Lisle thread or flannel excellent."

Poyet: "Walking is the best exercise. A well understood hygiene concerns the totality of the functions."

"After singing exercises that cause perspiration, rub down with flannel and alcohol and change clothing. *Alcoholics absolutely forbidden.*"

"Observe strictly general hygiene. Smoking irritates the pharynx, reddens the vocal cords, and may cause heart trouble harmful to singers."

"Avoid scented toilet powders. Two hours' work a day in study or singing is a maximum."

"Studies in the bypaths of vocal hygiene must be dealt with as they appear."

Resumé. Whatever contributes to the general health favors the health of the tonsil, and, also, the best condition of the voice.

The hygiene of the mouth, nose, throat, stom-

ach and bowels is favored by general and special cleanliness, fresh air, well ventilated sleeping apartments, abundant sleep, or repose, wholesome food, regular hours for eating, regularity of the bowels and regular hours for sleeping.

Walking, in moderation, in the open air, is the exercise *par excellence* for voice users.

Alcohol is irritating to the mucous membranes, and, also, for other reasons, has no place, as a rule, in the general system of hygiene.

As a younger man I felt more inclined to be easy with tobacco users, but the older I grow the more I see the bad effects of tobacco, and the less I am inclined to condone or cater to the habit.

A *clean* nose, a *clean* mouth, *clean* bowels, *clean* habits, are conducive to *clean* tonsils and a *clean* voice.

CHAPTER XIII

PRINCIPLES OF TREATMENT.

Professor John N. Mackenzie, of Johns Hopkins University, in an address on "The Massacre of the Tonsils," reported in the Maryland Medical Journal, June, 1912, says:

"Never in the history of medicine has the lust for operation on the tonsils been as passionate as it is at the present time; it is a mania, a madness, an obsession."

Evidently the treatment of the tonsil is in urgent need of revolution.

Professor Henry L. Swain, of Yale University, in an article entitled, "Are the Tonsils a Menace or a Protection?" published in the Annals of Otology, Rhinology and Laryngology, September, 1911, after referring to "the alluring, spectacular, and gory operation called tonsillectomy," and to "the practice in recent years of many operators all over the country, of enucleating the tonsils as completely as possible, in all cases, as a routine procedure," states that "The question of relative size, healthiness of structure, or any such matter is apparently never thought of. Even in adults there are other methods of bringing about a satisfactory and safe condition of the tonsils besides tonsillectomy."

Sir Felix Semon says: "I consider total enucleation not only dangerous, but also generally superfluous."

Marage says: "There is not *one* treatment for enlarged tonsils; there are *many*."

[NOTE.—The most skilful and experienced operators in the world have reported *deaths* from removal of the faucial tonsils; the list including such eminent technicians as *Mayo-Collier*, *Schmiegelow*, *Lennox-Browne*, *Escat*, *Sandfort*, *Marage*, *Haymann*, *Damianos* and *Herman*, eight cases; *MacBride*, *Zarniko*, *Henking*, *Schuchardt*, *Burger*, *Kenefick*, *Thomson*, *F. Stewart*, *Smith*, six cases; *E. M. Holmes*, *Gradle*, *Stucky*, *Hubbard*, *Goldsmith*, *Crockett*, twelve cases; *Sewall*, nineteen cases; *Richardson*, *Wishart*, and others.

Serious accidents have been reported, from the removal of the faucial tonsils by the world's best operators; including *Chiari*, *Luc*, *Semon*, *Hajek*, *Escat*, *Broeckhaert*, *Lennox-Browne*, *Wyatt*, *Gronbeck*, *St. Clair Thomson*, *Lack*, *Riviere*, 150 cases; *Damianos* and *Hermann*, 50 cases; *Hope*, *E. M. Holmes*, *Quinlan*, *Hayman*, 21 cases; *Murray*, 3 cases; *Matthews*, *Lamb*, *Munger*, *Roberts*, *Bulson*, *Jarecky*, *Shurly*, *Zarniko*, *Beck*, *Berger*, *Berens*, *Getchell*, *Hopkins*, *Richards*, *Hubbard*, *MacBride*, *Cohen*, *Coley*, *Hermann*, *Dunbar*, *Phillips*, *Tilley*, *Nettlebrock*, *Leipziger*, *Henking*, *Hedges*, *Jackson*, *Avale*, *Huber*, *Cline*, *Kan*, *Ryan*, *E. J. Brown*, *Cunningham*, *Henkes*, *Wilkinson*, *Urban*, *Weber*, *Woblews*, and others.

Among the accidents reported from removal of the faucial tonsil are: "Death from hemorrhage, immediate or secondary, recurrent hemorrhage, suspension of respiration and asphyxia,

respiratory arrest, three cases; cardiac arrest, one case (Jackson); convulsions from shock, mental disturbance, severe surgical shock, deep sloughing in tonsillar region (Berens); injury and laceration of the palato-glossei, palato-pharyngeus and superior constrictor muscles; injury of the internal carotid (Gray); injury of the internal carotid by Pancoast (George F. Steveson); injury of the arteria pharyngea ascendens (Haymann); injury of vomer (Haymann); accidental removal of greater part of the back horns of the turbinated bones by Zarniko (Haymann); injury of the atlas bone (Haymann); injury to uvula, pillars, temporary paresis of soft palate, 16 cases (Richards); paresis of the velum palati (Castex); alteration of speech from injury to pillars, 3 cases (Richards); troublesome hemorrhage (Hajek); free hemorrhage (Beck); serious hemorrhage, 50 cases with 19 deaths (Lindley Sewall); dangerous hemorrhage (Getchell); hemorrhage (Semon); hemorrhage, 50 cases (Damianos and Hermann); severe hemorrhage (Lamb); free hemorrhage and death (Stewart); alarming hemorrhage, 3 cases (Murray); serious hemorrhage, 3 cases (Brown); severe hemorrhage (Roberts); secondary hemorrhage, 2 cases (Jarecky); severe hemorrhage (Bulson); severe bleeding, 21 cases (Haymann); hemorrhage and death (Haymann); hemorrhage and death (Zarniko); secondary hemorrhage and death (Goldsmith); alarming hemorrhage (Lack); secondary hemorrhage and death (Damianos and Hermann); fatal hemorrhage (Burger); alarming hemorrhage (Quinlan); extremely severe bleed-

ing (Hope); severe hemorrhage (Escat); secondary hemorrhage (Thomas); unusual hemorrhage, 2 cases (Dunbar); hemorrhage (Leipziger); alarming hemorrhage, 2 cases (Brainard); secondary hemorrhage (Weber); alarming hemorrhage (Bulson); hemorrhage (Urban); severe hemorrhage (Ryan); grave hemorrhage (Cline); secondary hemorrhage, 3 cases (Kan); hemorrhage (Wilkinson); severe hemorrhage, syncope (Luc); hemorrhage, 6 cases (Henking); alarming hemorrhage (Leland); severe hemorrhage, 3 cases (Tilley); hemorrhage (Nettlebrock); repeated hemorrhages (Cunningham); alarming secondary hemorrhages (Chapman); severe post-operative hemorrhages, 3 cases (Barrell and Orr); secondary hemorrhage (Avale); severe infection of the wound (Haymann); hyperpyrexia and death (Richardson); hyperpyrexia and death (Wishart); hyperpyrexia and death (Ward); general sepsis and death (Dean); gangrene of the muscles of the neck (Dean); gangrene and death (Kinle); status lymphaticus and death (Dench), (Harris), (Packard); pneumonia, 2 cases and one death (Crockett); diphtheria of the wound (Lennox-Browne), (Caillé); septic inflammation of adjacent tissues; Vincent's angina and death; lateral pharyngeal abscess (Huber); abscess of palate, removal of one line of defense against microbial invasion (Ballenger); severe infective inflammation of cervical glands (Gronbeck); general staphylococcus infection, with staphylococcus current in all the organs (E. M. Holmes); subcutaneous surgical emphysema (Parrish);

septic infection of serous membranes (Coley); development of latent tuberculosis in adjacent glands and pulmonary tuberculosis (Ballenger); cervical adenitis (E. M. Holmes); hematoma in fauces (Ledermann); pneumonia (Hubbard); cerebral meningitis (Putnam); goitre, Basedow's disease; torticollis (wry-neck) (Hedges); permanent torticollis (Pierce); endocarditis, rheumatic arthritis, inflammation of Eustachian tube, inflammation of middle ear, affection of the ear drum, noises in the ear, acute otitis and mastoid disease (Citcelli); double otitis media with double mastoiditis (Richards); deafness, affection of vision, development of sarcoma (Delié); laryngitis, spasm of glottis (Cohen, Sewall); hoarseness, permanent impairment of the singing voice (Chiari, Lamperti, Loewenberg, Shakespeare, Sebastiani, Cappiani, Schumann-Heink, Mott, Bispham); tonsilliprivity (Escat); profound anaemia, St. Vitus' dance, general loss of health and strength, reflex nervous diseases, extreme contraction of wound, troublesome cicatrices, re-growth of tonsillar tissue in all cases (Levinstein, Brieger, Goerke, Escat, Magrage, Gröber); recurrent tonsillitis."

Haymann says: "The habit of reporting bad results is not often followed."

Richardson, *Washington Medical Annals*, Volume XI, Number 2, says: "It is a great misfortune that operators fail to report the complications of tonsillectomy."

In the *New York Medical Journal*, of August 17, 1907, there appeared an article on "*Litigation of the External Carotid Artery in Rhinology and*

Pharyngology." in which its author states that "he is convinced that the manifold use of external carotid ligation, and the ease and safety of its performance are not fully recognized. Ligation of the external carotid is relatively a trivial matter, compared with the more serious ligation of the internal and common carotids." He states that he "Has tied the external carotid artery thirty-eight times in thirty cases, both arteries being tied in eight cases; to arrest hemorrhage after tonsillectomy, seven cases; to forestall hemorrhage in extirpation of malignant disease of the tonsil and tongue, four cases; to forestall hemorrhages in extirpation of malignant disease of the maxillary antrum, three cases; to inhibit growth in malignant disease of the maxillary antrum, four cases; to forestall hemorrhage in extirpation of naso-pharyngeal fibromata, eight cases; to arrest spontaneous nasal hemorrhage, two cases; to arrest post operative nasal hemorrhage, two cases."

"After tonsillectomy, many serious and a few fatal hemorrhages have occurred."

In the *Annals of Surgery*, of December, 1907, in an article on "*Tonsillar Hemorrhage and its Surgical Treatment*," by the same operator, he states that:

"Few operations in surgery are done so badly as those upon the tonsils. Tonsillectomy is an exceedingly difficult operation to do ideally. Personally, the author is satisfied with but few of his tonsillectomies."

"Tonsillotomy is an easy but an utterly unjustifiable operation. Such an operation seals up

the glandular tissue of the tonsil under bands of cicatricial tissue which forever will interfere with throwing off of leucocytes, secretions, epithelial and other debris. Rheumatism, infective arthritis, endocarditis, tuberculosis and a host of other ills that modern research has traced in many instances to the tonsils are made worse or their occurrence is rendered more likely by incomplete removal."

If tonsillotomy "seals up the glandular tissue of the tonsil," as the above tonsillectomist asserts, then will not the facilities for absorption of bacteria be "sealed up" to precisely the same degree as the facilities for throwing off of leucocytes? Entrance and exit should be equally affected.

The statements of the operator quoted are *not in accord with modern research authorities*. *Eugene Hodenpyl*, a research authority, found upon research investigation that "the faucial tonsil in normal condition absorbs neither liquids nor solids." The researches of *Menzer*, *Hendelsohn*, *Lexer* and *Grober* confirm those of *Hodenpyl*. *Fränkel* has shown that "children affected with hyperplastic tonsils are less easily affected by diphtheria than children with normal tonsils."

That great pediatric authority, *A. Jacobi*, in the *Archives of Pediatrics*, July, 1906, states that:

"Exposure and many diseases change the surface and structure of the tonsil. Every new inflammation changes them. New cell infiltration and cicatricial tissue renders absorption less possible. That is why in advanced life the tonsil gets harder and smaller, and infections become less.

The same deleterious influence will no longer prove effectual."

Von Levinstein states that "Hardening of the surface of the tonsil is very desirable, in that it prevents any possible absorption of materes morbi by the organ."

The operator quoted above represents the extremity in radical operative surgery. Radicalism has an intrinsic value, but in operative surgery adds greatly to the surgeon's responsibility, and imposes upon him extraordinary obligations in diagnostic ability, supreme caution in positions of peril, and at all times an erudite and conscientious selection of cases.

"Bold in security and cautious in danger" is a safe surgical aphorism.

The operator who has tied so many external carotids, will find few followers. *It will be easier for him to destroy the external carotid artery, than to convince educated and experienced physicians of his right in doing so. The external carotid is an exceedingly important artery; and while it may be a "trivial" act to tie this vessel, the result of tying it will never become a "trivial" matter.*

Briefly consider the function of the external carotid. It carries the blood to the head and neck. It nourishes the face and nose and skin, muscles, nerves, and bones; it nourishes the muscles of the larynx, epiglottis, pharynx, tongue and jaw; the muscles of the hyoid bone, the tensor and levator palati, the soft palate, the middle and inferior constrictors of the pharynx, the masseter, buccinator, temple muscles, etc.

It nourishes the lining membrane of the larynx, pharynx, mouth, gums, nose, antrum of Highmore, ethmoid and sphenoid cells; the integument of the lips, face, forehead, scalp, pericranium, the dura mater, the Eustachian tube, tympanum of the ear, mastoid cells, semicircular canals and cartilages of the ear. It nourishes the tonsils, thyroid gland, laryngeal glands, sublingual, palatine, submaxillary, and lymphatic glands of the neck.

It nourishes the teeth, alveolar process, gums and nasal septum.

It nourishes the ganglion of the fifth nerve, the facial nerve, the sympathetic, hypoglossal and pneumogastric nerves.

I cannot believe that any "manifold use" will popularize the shutting off of nourishment to the area above mentioned, even though it may be shut off "with ease and safety."

A question of interest in regard to the thirty-eight ligations lies in the fact that thirty lives were so jeopardized by hemorrhages, actual or prospective, in the personal experience of this one laryngectomist, as to seem to demand, in his judgment, such an extreme measure as the tying of the external carotid artery. Of course, to tie this artery is to starve the parts which it supplied, except by anastomosis. We may hope that by anastomosis the vessels of one side of the head will sufficiently nourish both sides. But anastomosis can hardly be expected to take place to an extent that the arteries of the one side of the head will take complete care of the arterial function

of the whole head as nature designed by the original vessels.

Besides, we must remember that the operator quoted tied the external carotids on both sides in eight patients.

In the thirty-eight ligations, the operator does not state the nature of the eight cases in which he tied both arteries.

Seven cases out of the thirty were done to stop bleeding after tonsillectomy. It would be highly interesting to know the exact original conditions of the tonsils in these seven cases, that seemed to require tonsillectomy, which were followed by such alarming hemorrhages as to apparently necessitate ligation of the external carotids.

Without the data of the original conditions that seemingly indicated tonsillectomy, students in modern physiological research may view the question of surgical triumph in at least a portion of these thirty-eight ligations with lessened interest; and in the absence of the original light, might even consider tonsillectomies that necessitated subsequent ligation of the external carotids as possible surgical blunders. The original tonsillar conditions that preceded the tonsillectomies which caused post-operative hemorrhages that led to the ligations would be interesting to know.

With the announcement of his thirty-eight ligations, the operator ends his narrative.

How unfortunate! What rare opportunity these thirty-eight operations would have furnished for *subsequent scientific study of the effects of altered or impaired nutrition* of the nerves that control, and of the delicate muscles

involved in, the processes of phonation and deglutition, of the acuteness of audition, and of the general impairment of nutrition in the face, in the nose, etc. What a great opportunity was lost!

The excessive evil rôle charged against the tonsil has not been proved by any established facts in scientific pathology. That patients are scared into operations is a common observation. And false statements regarding benefits that are alleged to follow are daily shown to be untrue.

False evidence is sometimes offered by those even in positions of high authority.

Lennox Browne and *Emil Behnke*, in their work entitled "*Voice, Song and Speech*" (Seventh Edition) 1887, make the false statement that "Unfortunately there is a prejudice, very ill-founded and unsupported by any authority, against the radical cure by removal of enlarged tonsils. There is no argument whatever of any scientific value to be advanced against the measure, and there is the very direct evidence in its favor of many of our great singers. *Louisa Pyne*, *Patti*, *Lucca* and others have undergone the operation, not only without injury, but with actual benefits."

Louisa Pyne and *Lucca* are dead. *Patti* lives, but denies the statement. The name of no other *prima donna* has ever been published; and I do not believe that any *prima donna* ever lived whose voice was improved by enucleation. Not one case can I find of a *prima donna* whose voice was improved by enucleation.

2/3/10

RECEIVED
RECORDED

Craig-y-Dinas Castle,
Penrith, S. C.
Cumbria.

Dr. H. J. Faulkner
Pittsburg
Dear Sir

on her throat - or
trouble with the
liver

Tours faithfully
A. G. B. Alcock
-Serry

The 13th morning October
I received of your
letter of 14th inst. and
desire me to say that
she regret her inability
to give you the desired
information as she has
never had any operating.

Facsimile letter of Mme. Adelina Patti,
(Baroness Cedarstrom).

Gordon Holmes, in his work on "*Vocal Physiology*," Third Edition, 1900, remarks:

"It is stated that many of our greatest singers, from MADAME PATTI downwards, have undergone the operation of removal of the tonsils with the best results."

These statements of *Browne and Behnke*, *Sir Gordon Holmes and others*, regarding *Madame Adelina Patti*, now the *Baroness Cedarstrom*, are absolutely untrue, as proved by the following answer of March 2, 1910, of the *Baroness*, to my letter of inquiry:

"2/3/10 Craig-y-Nos Castle,
"Penycae, S. O.,
"Breconshire.

"Telegrams

"Abercraf, S. O.

"Dr. R. B. FAULKNER,

"Pittsburgh.

"Dear Sir:—The Baroness Cedarstrom is in receipt of your letter of the 14th inst. and desires me to say that she regrets her inability to give you the desired information as she has never had any operation on her throat or trouble with the tonsils.

"Yours faithfully,
"H. D. ALCOCK, Sec'y."]

The routine enucleation of the tonsils is condemned not only by Mackenzie, at Johns Hopkins University, and by Swain, at Yale, but also by authorities at Harvard University, Columbia, Pennsylvania, Vienna, Berlin, Paris, London and elsewhere.

Enucleation of the faucial tonsil is considered by the authorities to be a capital operation; more dangerous than amputation of the leg at the hip-joint; more fatal than removal of the appendix; and also to involve the destruction of values in the mechanism of song and speech.

The intelligent treatment of a diseased tonsil implies a clear understanding of what constitutes a *normal* tonsil.

The normal tonsil must represent a type. Disease represents departure from the type.

A knowledge of the anatomy and physiology of the normal type is essential in permitting one to note departures; and to aid him in restoring the organ to the normal.

When the eye becomes affected with cataract, or when strabismus occurs, it is unnecessary to enucleate the eye. Neither is it necessary to enucleate the tonsil, just because one or two of the follicles happen to become diseased. The same standard in education that requires an operator on the eye to have full knowledge of the anatomy and physiology of that organ should apply with equal force to an operator on the tonsils.

A greater variety and a more incongruous ensemble of opinions is inconceivable, than are now held by the general profession regarding the treatment of diseased tonsils.

Hicguet (Brussels) in the report of his researches on the "*Functions and Utility of the Faucial Tonsil*," to the *Société Belge d'Otologie, de Rhinologie et de Laryngologie*, "complained that the diversity of theories which he had met with in his work had put him to much pains to form the conclusions at the end of his report."

The perplexity of *Hicguet* may be appreciated when such an excellent man as *H. Holbrook Curtis*, in reply to my research question: Have the normal faucial tonsils any function, physiologic, biologic, chemical, phonetic, or other? answered, "In my opinion—no." (March 3, 1910.)

And in his book, entitled "*Voice Building and Tone Placing*," he remarks: "They are best removed, if they give the slightest trouble."

And when *Eugene Hodenpyl* replied to the same question: "The function of the faucial tonsil is unknown." And when *G. Hudson-Makuen* replied to the same question: "I do not know" (December 17, 1909). And in the *New York Medical Journal*, June 19, 1909, he remarks:

"Generally speaking, a visible tonsil is abnormal and pathological. The more diseased and consequently the more harmful tonsil is the one that is scarcely visible at all."

"The diseased tonsil should be removed *in toto* with its capsule intact. I have said that the faucial tonsils are the seat of numerous operations and I shall go further and say that these operations should be far more numerous and more radical. I think I am peculiarly qualified to speak with authority upon this subject, be-

cause of my unusual opportunities for careful studies of the mouth and fauces both before and after operations in connection with my work in defects of speech."

And again, in the *Transactions* of the American Laryngological Association, 1911, he says: "There is no absolute standard of vocal excellence, and the voice that sounds good to one person may sound very different to another. Whether a voice is good or bad depends, not actually, but practically, upon the ear of the listener. This fact may account, perhaps, for the great difference of opinion now prevailing as to the effect of tonsil operations upon the voice."

And when *Edwin Pynchon*, in reply to my question, What are the functions of the faucial tonsils? says:

"I am disposed to think that they have no function except to cause trouble. I frequently remove tonsils which have been passed upon by other specialists as being 'normal'." (December 11, 1909.)

And in the *Alkaloidal Clinic*, October, 1897, he says:

"The exact cause of hypertrophy of the tonsils is *not* clearly known. For all these conditions enumerated, depending upon enlargement or degeneration of the tonsils, a positive cure can be guaranteed. The only rational treatment is surgical, viz.: the thorough and total ablation of all hypertrophied or diseased follicle-bearing tissue."

And in the *Journal of the American Medical Association*, March 21, 1903, he says:

"While many of the chronic diseased conditions of the tonsil possess individual characteristics under microscopic examination, the *importance of differentiating the several varieties* which have been described *is much diminished by the fact that any and all of the simple chronic forms of tonsillar disease are equally amenable to the same treatment*, viz.: that of *thorough eradication.*"

And in the *Illinois Medical Bulletin*, April, 1905, he says: "While different theories have been advanced as to the *functions* of the tonsils, *none of them have been proved*; and the *undisputed clinical fact remains*, that the patient *invariably improves in health after their removal.*"

And when *Charles M. Robertson, Journal of The American Medical Association*, August, 28, 1909, says:

"If the tonsil IN A NORMAL state is removed in toto there is no disastrous after effect, as in the case of the thyroid. *On the other hand, the individual is improved in health.* It is claimed that the tonsils in particular cases, has come to have a function in modulating the voice. This, however, I look on as a mere matter of education, and the singer or speaker would have come to modulate the voice just as well without this gland as with it. *On the other hand*, we have all seen cases in which the voice was *increased in tone and volume* by the removal of these growths. *The richness of quality and volume of tone is often added to 100 per cent. after the enucleation.*"

And when *William L. Ballenger* in his work

entitled "*Diseases of the Nose, Throat and Ear,*" 1908, states:

"Singers and public speakers, with a troublesome subacute laryngitis, whose tonsils are *small and fibrous, or enlarged*, may be benefited by the complete ablation of the tonsils. The function of the tonsils in a child and in an adult *is still an open question.* It is being more and more recognized that the complete enucleation of the tonsil with its investing capsule is the most satisfactory method of dealing with *diseased tonsils.*"

"In the following indications, it should be remembered that they are given with especial reference to the complete operation, technically known as *tonsillectomy*: (a) Nasal catarrh, (b) Ear Diseases, (c) Recurrent enlargement of the deep glands of the neck, (e) When the crypts of the tonsils are found more or less filled with debris and bacteria, (f) Laryngitis with attacks of hoarseness, crypts diseased, and tonsils hypertrophied, (g) Hypertrophy of the tonsil, (h) Chronic follicular tonsillitis, (i) Follicular pharyngitis, (j) Tuberculous infection of the tonsils, (k) Recurrent acute articular rheumatism following acute tonsillitis."

And when *Dan McKenzie, British Medical Journal*, November 19, 1910, says: "*Enucleation should always be performed when the tonsil is diseased and not merely hypertrophied.* There is another variety of the enlarged tonsil which should be dealt with by careful removal. I refer to what is known as the buried tonsil."

And when *St. Clair Thomson* in response to my query: Would you, as a rule, advise the removal

of normal tonsils? answered, "It is *impossible to define what is a 'normal tonsil.'*"

And when *Lermoyez* in response to my query, answered, "I consider that the normal tonsils are organs that *must be respected*. *One should never remove the human organs: not more a normal tonsil than a healthy tooth or a healthy eye!*"

And when *Barth* answered. "I do *not* remove normal or *slightly hypertrophied tonsils*. If one wanted to do that, one would have to perform in any normal man a number of prophylactic operations."

And when *Lubet-Barbon* answered,
"I think there is *never* an indication to remove a normal organ, and for myself, I *never* remove tonsils *responding to the type you call normal*, like volume and like condition of the gland, without chronic inflammation, without crypts, without adherence to the pillars, and elsewhere."

And when *Escat* answered: "It is *not necessary* in my opinion, to set one's heart upon *completely extracting all the tonsillar tissue* as various *American confreres proposed*. The tonsil is not an epithelioma!"

And when *Frank E. Miller* in response to my query, Would you, as a rule, advise the removal of normal tonsils? answered, "Never, if as described in question number one."

And when *Chiari* answered, "Greatly enlarged tonsils in elder professional singers should *never* be removed."

And when, to the same query, *Von Schrötter*, *Schmeigelow*, *Van Baggen*, *Escat*, *Moure*, *Luc*, *Castex*, *Massei*, *Gleitsman*, *Gleason*, *Coolidge*

and others, declare that *normal tonsils should not be removed*, it is no wonder that *Hicquet* was pained in forming the conclusions to his research.

Judged by the rule of *Pasteur* that, "*In experimental science it is always a mistake not to doubt when facts do not compel affirmation,*" it is pertinent to ask,

What fact compels the affirmation of *H. Holbrook Curtis*, that "the faucial tonsil is best removed, if it give the slightest trouble"?

What fact compels the affirmation of *G. Hudson-Makuen*, that "*a visible tonsil is abnormal and pathological*"; that "*the more harmful tonsil is the one that is scarcely visible at all*"; that "*the diseased tonsil should be removed in toto with its capsule intact*"; that "*operations should be far more numerous and more radical*"; that "*the rather common belief among the laity that the removal of the faucial tonsils impairs the voice is altogether without foundation*, except in those cases in which injury is done to the palate or other surrounding structures" (*New York Medical Journal*, June 19, 1909): that "*the removal of tonsils is injurious to the voice is well founded*, and it is due in large measure to careless or bad surgery" (*Transactions, American Laryngological Association*, 1911)?

What fact compels the affirmation of *Edwin Pynchon*, that "*he thinks the tonsils have no function except to cause trouble*"; that "*the exact cause of hypertrophy is not known*"; that "*for all the conditions he enumerates, depending upon enlargement or degeneration, a positive cure can be guaranteed*"; that "*the importance of differ-*

entiating the several varieties is much diminished by the fact that they are equally amenable to the same treatment?

What fact compels the affirmation of *Charles M. Robertson*, that "If the tonsil in a *normal*, state *is removed in toto* there is *no* disastrous after effect, as in the case of the thyroid. *On the other hand*, the individual *is improved* in health"; that, "The richness of quality and *volume of tone* is often added to 100 per cent. after the enucleation"?

What fact compels the affirmation of *William L. Ballenger*, that "singers and public speakers with troublesome subacute laryngitis, may be benefited by the complete ablation of the tonsils"; that "it is being more and more recognized that the complete enucleation is the *most satisfactory* method of dealing with *diseased* tonsils"?

What fact compels the affirmation of *Dan McKenzie*, that "enucleation should *always* be performed when the tonsil is *diseased*, and not merely hypertrophied"?

What fact compels affirmation of *Stöhr's* statement, that "the surface of the tonsil presents openings that may allow the entrance of infectious material"?

What fact compels the affirmation of *Mandl's* statement, that "excision of enlarged tonsils is followed by *no* inconvenience to the voice, *but is always beneficial to it*"?

What fact compels the affirmation of the statements of *Lennox Browne* and *Emil Behnke*, *Sir Gordon Holmes* and others, that "*Many of our greatest singers, from Madame Patti down-*

wards, have had their tonsils removed, not only without injury, but with actual benefits to the voice?

The many deaths, the numerous accidents, the unskilled army of operators, and the sharp criticisms of men who stand high as medical authorities, added to the strong protest of the whole voice profession and of thousands of intelligent laymen, make the radical revision of tonsillar treatment and a reasonable unity of professional proceeding, an urgent and absolute necessity.

When *Von Levinstein*, in his critical review, states that "No physiological function has been proved for the faucial tonsil"; when *Hodenpyl* declares that "its physiological function is unknown"; when *H. Holbrook Curtis* says that, in "his opinion, it has no function"; when *Scripture* states that "it has no known phonetic use"; when *Lubet Barbon, Coolidge, and G. Hudson-Makuen* say they "do not know its function"; when *Luc* "has no personal views on the subject of its function"; when *Wesley Mills* believes its function is so slight that its work can be readily compensated for by other organs"; when *St. Clair Thomson* says: "It is impossible to define what is a 'normal' tonsil"; when *Sir Felix Semon* declares that, "*I do not believe that an extension of the range of the voice usually follows removal of the tonsils*"; when *Sebastiani* states that "the greater the development of the tonsils the greater is the difficulty with resonance and with the emission of the tones of the second register or high notes: even the removal of the normal tonsils does not facilitate these high sounds"; when *Chiari*

declares that "In elder *professional singers* a peculiar disturbance of the voice occurs if their large tonsils have been removed; the faucial arches lose their support, the faucial muscles cannot contract properly; the resonance of the voice is impaired, and the tones suffer in strength and fulness"; when *Loewenberg* says, "I do no know of any case in which a singer's voice was improved by the removal of normal tonsils. On the contrary, I know of cases in which the removal of normal tonsils have caused permanent detrimental effects to the voice. For these reasons, I disapprove of operations upon normal tonsils in all cases"; when *Mme. Cappiani* (*Hints and Helps in Singing*) states: "I complained about my red and big tonsils. But my brother, Frederic Young, dramatic tenor for years, at the Royal Court Opera in Munich, said he found in his career that all those prima-donnas with extraordinary voices, had big tonsils"; when *John Howard* says, "The greater size of the tongue is noted when the voice is full and resonant. The renowned *Catalini*, *Lablache*, and *Santini* furnished examples"; when *Masini* and *E. L. Shurly* think "It has an internal secretion"; when *Escat* in accord with *Allen* is "of the opinion that it secretes a principle, useful in the development and growth of the subject, and probably, to the growth of the skeleton"; when *Metchnikoff*, *Chiari*, *Schmiegelow*, *Massei*, *Barth*, and *Gleitsmann* believe "that it has a leucocytic protective function"; when *Brieger*, *Goerke* and *Fränkel* teach that "it has a protective mechanism"; when *Fränkel* "denies the statement of *Stöhr* that the

surface of the tonsil presents an open wound for infections to enter"; when *D. Bryson Delavan* states that "removal of tonsils was probably one of the earliest operations known, and the fact that for many generations it was abandoned rather points to the belief that there must have been some good cause for its abandonment and he urges caution in returning to tonsillectomy as a routine practice"; when *Swain* "deplores tonsillectomy as a routine practice in young children"; when *Grober* says that "The tonsils seem to be a less favorite settling place for tubercle bacilli than the lymph glands"; when *Moure* believes "It has physiologic, biologic, chemical and phonetic functions"; when *Gleason* thinks "It has other functions besides those of the lymphatic system"; when *Von Levinstein, Fränkel, Escat* and *Lermoyez* state that "You should cure the tonsil when it is diseased," that "you have no authority to remove it"; when *Loewenberg* says, "Normal tonsils, according to my experience, should never be removed by operation, neither on account of the effect upon the general health, nor of the functional activity of the organ itself. Even though the physiological significance of the tonsil still rests upon a hypothesis, this, like any other healthy organ in the body, should be left undisturbed"; when *Sir Felix Semon* and *John N. Mackenzie* "deplore the discrediting effects of intemperate surgery upon the specialty of laryngology"; when *Frank E. Miller* considers "the tonsil to be a regulator of pillar action"; when *Van Baggen* states that "it certainly has a phonetic function; that its position between the

pillars of the fauces is of great importance with regard to the exactitude and perfectness of movements of the pillars and muscles of the soft palate"; when *Lamperti* and *Mme. Cappiani* state that "the tonsils are most necessary for modulation in singing, that without them it is difficult, sometimes impossible, for the voice to modulate"; when *Mme. Mott* says "the normal tonsils are of use to singers, in so far as they preserve the original structure of the throat, on which depends the original beauty of the voice"; when *Hubbard* states that "after their removal there is a difficulty in assuming different shapes of the pharynx necessary in singing, causing a hardness in quality and laborious action"; when *Mme. Everett* says, that "after removal of the tonsils there is always something gone from the voice that does not come back—the personal charm"; when *Mme. Lilli Lehmann* "gives warning to singers against unprincipled physicians who daub, burn, cut, and make everything about the larynx worse instead of better"; when *Salvatore Marchesi* "charges a class of laryngologists with betraying their scientific mission, and with creating disorders and diseases among singing people"; when *Frederic Young* states that "all the prime donne he had ever known, whose voices were of particular quality and value, had large tonsils"; when *Garcia, Mme. Viardot-Garcia* and *Mme. Von Klenner* "objected seriously to any operation upon a normal throat for the purpose of improving the singing voice"; when *Mme. Lilli Lehmann* "will never advise the removal of anything from the singer's throat, but

would always try to cure it without any operation"; when *Charles A. Rice* considers "the removal of any part of a normal tonsil unnecessary, and that it will in no way aid tone production or quality"; when *Mme. San Carola* says, "Even when tonsils are abnormally large, she always opposes any proposal to remove them by surgery"; when *Jean de Reszke* "knows of only one case among all his pupils of the tonsils having been removed"; and *Sabatini* has "only twice ever recommended removal of tonsils (both cases being abnormal)"; and *Van Baggen* "has advised the removal of only two tonsils in eight years"; when *Lamperti*, *Mme. Cappiani*, *Mme. Mott*, *Bristol*, "are decidedly opposed to the growing tendency of removing tonsils in singers"; when *Curry* "never knowingly had a pupil whose tonsils were removed"; when *Lamperti*, *Mme. Cappiani*, *Sir Charles Santley*, *Mme. Mott*, *Sabatini*, *Mme. Von Klenner*, *Sweet*, *Hubbard*, *Townsend*, *Mme. Lillian Nordica*, *Mme. Schumann-Heink*, *Mme. Tetrazzini*, *Bonci*, *Bispham*, *David C. Taylor*, *Miss Cecelia Winter*, "have never known of an instance, in which the singer's voice was improved, after removal of the normal tonsils"; when *Shakespeare* reports pupils whose "voices have suffered from faulty operation"; when *Sebastiani* states that "in cases of enlargement of the tonsils, while excision may be of some benefit to the voice in general, it may not be of any benefit to specialized organisms endowed with exceptional and valuable voices. In these uncommon conditions, any surgical operation whatsoever, it

matters not how perfect, can cause harm to the precious instrument"; when *Lamperti, Mme. Cappiani, Sebastiani, Shakespeare, Mme. Mott, Mme. Von Klenner, Mme. Schumann-Heink, Bispham, Hubbard, Taylor, Mme. Everett*, "have personally known of many cases in which the singer's voice was impaired after removal of the tonsils"; when *Mme. Adelina Patti* (now Baroness Cederstrom) has informed me that the statements of *Sir Gordon Holmes, Lennox Browne* and *Emil Behnke* and others are false when they say that she ever "had an operation done on her throat, either to remove her tonsils, or to improve her voice in any manner whatsoever"; when *Von Chiari, Von Schrötter, Barth, Schmiegelow, Brieger, Goerke, Fränkel, Grober, Von Levinstein, Schoenemann, Escat, Moure, Loewenberg, Massei, Semon, Marage, Ler moyez, Lubet-Barbon, Luc, Castex, Van Baggen, F. E. Miller, Curtis, Mackenzie, Ross, Beverly Robinson, G. B. Rice, Holmes, Mills, Gleitsmann, Gleason, Hodenpyl, C. H. Knight, Makuen, A. Coolidge, Jr., Mac Callum, Casselberry, Wood, Lamperti, Shakespeare, De Reszke, Santley, Sebastiani, Mme. Lehmann, Mme. Cappiani, Mme. Mott, Sabatini, Mme. San Carola, Mme. Marchesi, Charles A. Rice, George A. Sweet, Mme. Von Klenner, Mme. Clara Kathleen Rogers, Fergusson, Hubbard, Townsend, S. S. Curry, Charles A. White, Bristol, Mme. Everett, Taylor, Mme. Schumann-Heink, Mme. Nordica, Mme. Tetrazzini, Mme. Fremstad, Bispham and Bonci*, declare that "normal tonsils should never be removed"; when we

review the diversified opinions of the most eminent scholars, thinkers and teachers, of both the medical and voice professions; when we hear the sharp criticisms of *Fränkel* and *Mme. Lehmann*, of *Lermoyez* and *Lamperti*, of *Semon* and *Marchesi*, of *Von Levinstein* and *Sebastiani*, of *Mackenzie* and *Bispham*, of *Mme. Cappiani* and *Mme. Schumann-Heink*, then we are compelled to admit that the popularity of tonsillectomy lacks authority, and that the treatment of the tonsils needs to be tempered with scientific moderation and scientific unity.

Haymann declares that "the great majority of deaths caused by enucleation are not reported."

Sir Felix Semon (*Diseases of the Upper Air Passages*) "maintains that the frequency with which local interference is advised and practiced nowadays is far in excess of actual requirements; that operations are performed wholesale where they are not needed, that operative proposals are being made and carried out on an extensive scale on the basis of some unproven theory, and that the operative interference often enough, is unduly severe and protracted in proportion to the smallness of the complaint for which it is undertaken."

"Not every little bundle of adenoid tissue by chance discovered in the vault of the pharynx must needs be removed, nor ought every tonsil to be cut which slightly projects beyond the palatal arches."

John N. Mackenzie (*The Massacre of The Tonsils*) says: "The mere size of the tonsil is of itself no indication for removal except it be large enough or diseased sufficiently to interfere

with respiration, speech, or deglutition, in which case, it, or a sufficient portion, should be taken away without delay. A large tonsil does not mean necessarily a diseased tonsil, nor does a small tonsil always indicate a healthy organ. The tonsil may be greatly enlarged, may extend far down into the pharynx, or be buried deeply in the palatine arcade, and yet not interfere with the well-being of the individual. Such tonsils are the special prey of the tonsillectomist. If they are not interfering with function, they had best be left alone, for they are doing no harm. *The change in anatomical relations after operation is often so great that function is crippled more after their complete removal than it was before.* Moreover, it occasionally happens that the resurrection of a 'buried' tonsil is followed by the burial of the patient."

"If, in infancy and childhood, we pay more attention to the neglected nasal cavities, and to the hygiene of the mouth and teeth, we will have less tonsil disease and fewer tonsil operations."

"In the permanent removal of tonsil disease, equally good, and in the long run even better, results may be obtained in a large percentage of cases by measures less radical than those usually employed at the present time. Take the case of recurring quinsy. In this condition, it has been found that it is frequently only necessary to thoroughly slit up and shrink the upper lobe of the tonsil. Most quinsies occur in this situation and the destruction of that part of the tonsil is all sufficient to prevent recurrence."

"*The truth is slowly but surely dawning,* and

at no distant day will irresistibly emerge into recognition that *the so-called complete enucleation—the chief objection to which is that it can never be made complete—except in individuals in whom the organ is totally diseased, is an unnecessary operation in the great majority of cases in which it is at present done*, and may be supplanted by many other methods which are *perfectly safe and efficient and not open to its many serious objections.* That the tonsil has some important mission to fulfil is shown from its frequent re-appearance after enucleation—a protest as it were—on the part of nature against the total destruction of its functions.”

“Enucleation is done all over the land by operators of all kinds, and *if the truth were known*, with great mortality. Let us hope that the day is not far distant when not only the profession but the public shall demand that this senseless slaughter be stopped.”

“The tonsil should not be sacrificed any more than any other organ, without convincing evidence that it is the cause of the disease to be removed.”

Swain: “Even in adults there are other methods of bringing about a satisfactory and safe condition of the tonsils besides tonsillectomy. These latter methods I almost universally employ by preference.”

Roe: “Patients sometimes complain more of septic trouble around the neck and of glandular swellings after the tonsil operation than before it.”

W. K. Simpson: “There may occur, always, a

filling up of the tonsillar fossa with cicatricial, adenoid and connective tissue, and from this there may arise an interference with the muscular action of the velum, which would be just as harmful as the leaving behind of a small portion of the tonsil."

Watson Williams (*Journal of Laryngology*, October, 1910) : "In rheumatism, which has been ascribed to tonsillitis, I have frequently found the tonsils atrophied or absent. I do not think, therefore, that enucleation is the best operation."

Lambert Lack (*Journal of Laryngology*, October, 1910) holds that "enucleation should never be the routine operation. The need of getting every crypt away is exaggerated."

Syme (*Journal of Laryngology*, October, 1910) states that, "Enucleation is not necessary in every case. What should be done with the granulation tissue which fills up the fossa after enucleation? The after effects of enucleation are more severe than those after tonsillotomy."

Dan McKenzie (*British Medical Journal*, November 19, 1910) : "One would be very cautious in recommending enucleation to a professional singer, for obvious reasons."

A. Jacobi (*Medical Record*, August 19, 1911) : "Does not believe that operations on the tonsil should be done as frequently as some seemed to think. It is not a matter of indifference whether the capsule is removed or not. We should learn that infection through the capsule is rather difficult; the capsule is a protection to the blood and lymph circulation."

"I desire to emphasize the desirability of keeping the nares clean both before and after operation: if there were greater care in this respect so many operations on the tonsil would probably not be necessary."

Escat (Oto-Laryngologique Presse, Belgian, No. 7 of 1910): "Adenoid tissue is not neoplastic; why then be so bent upon extirpating the tonsil as radically as if it were a cancer? It is to be feared that if tonsillectomy, following the American method, becomes very common, the cases of operative hemorrhage will multiply and that the good reputation of tonsillectomy will suffer from it."

Schiffers (Oto-Laryngologique Presse, Belgian, No. 7 of 1910): "When it concerns the setting forth of therapeutic, and above all, of operative conditions, it is necessary to consider the normal and pathologic state of an organ."

"Tonsillectomy is not imposed, and is not justified except in cases of malign tumors of the tonsil. The tonsil itself is, however, very rarely attacked by suppuration: there exist certainly suppurative follicles, but the interstitial tissue itself does not suppurate. When we speak of tonsillitis, it concerns, in the immense majority of cases, peritonsillitis."

Cheval (Oto-Laryngologique Presse, Belgian, No. 7 of 1910): "If it is evident that the pathologic tonsil may be a source of infection and has no longer the power of coming to the defense of the organism; per contra, in a state of perfect health and under ordinary circumstances, the

physiological tonsil has for its function the assisting in that defense."

Delsaux (Oto-Laryngologique Presse, Belgian, No. 7 of 1910) : "Simple hypertrophic tonsils are rarely accompanied by ganglionic invasions of the neck."

Gröber (Die Tonsillen als Eintrittsspforten für Krankheitserreger, besonden für den Tuberkelbacillus) : "Many authors have considered diseased tonsils as more liable to microbial infection than healthy ones. *If that is true, it has not been proven.*"

"The best prophylactic measure is cleansing and disinfection of the mucous membrane of the oral cavity, and dentistry. Besides, medical science shows that the entrance of the microbes into the system does not always produce the disease. It is important how strong the defensive processes of the body are. Therefore, infectious diseases are mostly constitutional diseases."

Von Chiari (Die Krankheiten Des Rachens, 1903) : "I would like to call attention to a peculiar disturbance of the voice. One does observe this in elder professional singers if their large hypertrophic tonsils have been removed."

"Although it is rare in grown people that the hypertrophy of the tonsils assumes an intense degree, but in such cases the tonsils push apart the faucial arches and stretch them very much in the course of years. The muscles of the faucial arches become insufficient, while the faucial arches remain tense, being supported by the big tonsils. If these tonsils are removed to the bottom of the sinus tonsillaris, the faucial arches lose

their support and their muscles cannot contract to keep the arches tense. Thus for the singer the equal tension of the walls of the resonance tube is disturbed. *Enlarged tonsils which produce no trouble and which do not too often produce inflammation of the throat, should be left alone. Especially in elder singers.* In these cases, the only thing to do is to amputate the protruding part, but *never* to extirpate the whole organ."

Von Levinstein (Kritisches zur Frage der Funktion der Mandeln, Archiv für Laryngologie, 23 Bd. 1 Heft.) says: "There is no doubt that a great number of anginas have to be considered as a primary acute infection of the tonsils. Of course, the tonsils can become affected secondarily; as following endonasal operation, via the blood current, etc."

"The possibility of primary infection is conceded by the friends of the protective theory only when the protective mechanism is disturbed. But that according to the protective theory, the tonsils are not primarily diseased, but secondarily via the blood and lymph vessels from another organ primarily diseased."

"That the latter modes of infection do not happen rarely *I have conceded* and mentioned angina traumatica after operation on the nose as well as by the blood."

"There seems to be no doubt that the tonsils are very often diseased primarily, and that their frequent secondary infection does seem to be approved; that they are particularly well protected against infections."

"I would like to mention the galvanocautic treatment of the tonsils as a means of protection against the frequent affections of angina. This treatment apparently makes the surface of the tonsils more resistible against infectious germs. This treatment is the best remedy against relapsing anginas."

"Winslow claims that the tonsils are a menace to the system. I rather believe that the infection theory is too extreme. But if the tonsil offers less resistance to the entrance of infections than its neighborhood, we are still not entitled to talk of a danger to the system from this organ. And if Bosworth, Hendelssohn and others come to the conclusion that the tonsil as a continuous danger for the body should in persons be totally eradicated, I cannot come to the same conclusion, for if I know of an organ that easily becomes infected, this organ should not be destroyed, but we should try to perfect it as much as possible against the danger of infection which in the tonsil is not so difficult to do. We should decrease the micro-organisms of the nose and throat by keeping the nose and throat clean."

"The healing of angina relapses after a careful treatment of the nose is caused through reducing the infectious germs present in the nose. Also throat antiseptics will reduce the number of micro-organisms in the throat. Another remedy to prevent the infection of the tonsils is a systematic hardening of the body. Hardened persons contract colds less easily. Therefore, next to the care of the nose and throat, general

systematic hardening of the organism is the best protection against infection of the tonsils."

"When the tonsils become diseased in spite of the above means, therapy has to become more energetic, by treating the tonsils locally, mainly by galvano-cautery, which makes these organs more resistible. It makes the entrance of germs more difficult. *By this treatment, we do not intend the radical destruction of the tonsils, as only the surface is healed. We desire to make the organ more resistible. We want by our process to cure and not to destroy,* as do the believers in the extreme infection theory. *Such a total and lasting destruction of the tonsillar tissue, is, as Goerke has proved, absolutely impossible, for it regenerates always.* Therefore, the tonsils, as organs easily infected must be particularly protected against the possibility of infection, by reducing as much as possible the infectious germs in the nose and throat; by hardening of the whole organism; and in cases where these remedies are insufficient, galvano-cautery of the tonsils should be used."

"If the organ is in the condition of acute infection, we should consider whether the disease is local or general. *If local, we will get good results by local means; if general we will have to treat the general infection.*"

"*I cannot approve of eradicating the tonsils.* If I am told that the tonsils have no distinct function, and on the other hand become easily diseased and therefore not the slightest cause exists to save these organs, I must say that it is not impossible that the tonsils have a dis-

tinct physiological function only so far we have no proof for it. *And then even if it were sure that the tonsils had no distinct function, I would not give up my conservative standpoint. For if an organ of our body and even one which is not necessary for the existence of the organism should prove less resistible than other organs, this circumstance does not at all entitle us to destroy this organ. Our task should be to prevent the disease of this organ by reducing the infectious germs and strengthening the organ through local and general means.* Who of us for the reason only that because he knows that his tonsils will become easily infected would allow his healthy tonsils to be eradicated; *in other words, that he submit to an operation which is absolutely not simple, and which besides can never be completely done as the adenoid tissue is continuously regenerated.*"

Von Levinstein (Archiv für Laryngologie und Rhinologie, Bd. XXIV, Heft 2, 1911). "In the treatment of chronic tonsillitis and angina according to the method which I have described, there will rarely be occasion to resort to radical measures, for example, tonsillectomy."

"Tonsillectomy, the object of which is not to heal microscopically and macroscopically diseased portions of the organ but to remove it root and branch, should never be resorted to before it has been demonstrated that the infectious disease of the tonsil cannot be overcome in any other way. My method of using galvano-cautery is not only to be considered a conservative method in that in nearly all cases only a portion of the organ is at-

tacked and its structure altered, but that in nearly all cases recovery is brought about in a much shorter time."

"The most frequent source of quinsy, by far, from which people suffer, is the upper lobe of the tonsil. In a great many cases, it is often unnecessary to do anything more than to properly free the upper lobe, thoroughly slit it up, and take care of it. Where only a part of the tonsil is affected, as for example, the upper part, or only a single follicle, then only that part should be treated."

"Finally, in all bad cases, according to my experience, before resort is had to tonsillectomy, an attempt should be made to cure by the use of galvano-cautery according to the method I have just described. After that, in particularly obstinate cases, which I am convinced will be the exception, tonsillectomy may be indicated. And I hope, in view of these investigations and statements, the radical removal by operation of an organ, the uselessness of which to the general system has by no means been proved, will be less frequently performed."

Von Lénárt (*Archiv für Laryngologie und Rhinologie*, Band XXI, Heft. 3, 1909): "(1) Material that has forced its way into the nasal cavity can reach the tonsil via the lymph channel. Hence it follows, and has been proved by clinical experience, that infectious material from the nose reaches the tonsil via the lymph channel and may start inflammatory processes there."

"(2) It confirms A. Most's contention con-

cerning the course of the lymph current in the nose and throat, which he arrived at through his anatomical studies."

"(3) It follows from our experiments that foreign bodies which get into the tonsils are to some extent expelled therefrom toward the surface of the tonsil."

"(4) There is a very intimate connection between the lymph vessels of the two tonsils. For an injection in one side distributes itself not only to the corresponding tonsil but also to the one on the other side."

It therefore makes no difference how clean you keep the surface of the tonsil, septic material may pass from one tonsil to the other, *underneath* the surface, via the lymph channels. This fact gives one a very different understanding from the usually accepted idea that the tonsils are commonly affected merely from matter soaking into them from the mouth.

Sir Felix Semon says that, "A thoroughly sufficient operation is by no means identical with 'complete removal' of the gland. I have from the time of my earliest operations, endeavored to take off so much of the tonsils that they become at least reduced to the maximum of their normal size, that is, that they do not project beyond the palatine arch. In many hundred cases of tonsillectomy in my own practice I have but once seen a considerable re-enlargement take place. I recommend surgical interference with enlarged tonsils only when they cause serious symptoms and not merely on account of the enlargement *per se*. Comparatively large tonsils in a roomy

pharynx are no doubt much less mischievous *per se*, than most smaller ones in a naturally very narrow throat. I have no doubt that tonsils can be equally well removed by very different methods. I consider total enucleation not only dangerous, but also generally superfluous."

The limitations of a language hinder the spread of scientific knowledge. It is a matter of regret that monographs of great value lie buried in some foreign language, interesting only to a few, inaccessible to those who read English only, and are never translated because of no remunerative value to a publisher.

For instance, I cite the work of *Marage*, director of the course of lectures at the *Sorbonne*, than whom, in his line, there is no higher authority in *France*, nor even in the world.

In his extraordinary monograph on "*Traitem-
ment Medical des Végétations Adénoides*," he says: "I have waited seven years before revising this work with a view of having the results certain; and I can rest my statistics upon more than five hundred cases cared for by this method."

"With this medical treatment, we do not have to fear the relapses which are so frequent after an operation."

"This method is exempt from all danger."

"We think that medical treatment can replace the surgical method in ninety-two per cent of the cases observed among our patients."

Marage's statements are remarkable and deserve profound consideration. His monograph is certainly the most scientific treatise upon the

subject that has appeared in any language. I have found no mention of it anywhere. I fully endorse and constantly use his method.

Another monograph, very complete and of great scientific value, is that of *Marage*, entitled "*Quand et Comment Traiter les Amygdales Hypertrophiées*," in which he declares that:

"There is not *one* treatment for hypertrophy of the tonsils: there are *many*: it is for the surgeon to know which to choose. The better proceeding will be that which gives the better result."

"It is necessary to place ourselves in those conditions where we have never to fear a fatal issue."

"It is of the first importance to completely withhold all anaesthesia, no matter what it be, unless the conditions are very exceptional."

"The second important matter is to employ different methods, according to the nature of the case: a certain proceeding perfect for an infant is dangerous with an adult; another, applicable to a docile patient, is impossible with a child who fights or struggles."

"*Summing all up, there are indications and contra-indications innumerable, which it is necessary to take well into account.*"

The teaching of *Marage* is eminently sound and successful.

"If by chance there is a secondary hemorrhage, it may be easily arrested," he says, "with perchloride of iron, the thermo-cautery, or the galvano-cautery, or finally, with the forceps."

Calcium lactate, also, is now used by many

operators to assist in controlling or preventing hemorrhages of the upper air tract.

Von Levinstein (University of Berlin), than whom there is no higher authority in the world on the subject, in a most exhaustive and convincing communication, "*Zur Behandlung der Tonsillitis Chronica und Angina Habitualis*," in the *Archiv für Laryngologie*, Heft 2, Berlin, 1911, says: "If a part of the tonsil is diseased, as for example a single follicle, then *only* that part should be treated, *not* the entire organ."

Von Chiari (University of Vienna), who ranks as second to no other authority upon the surgery of the throat, in his work entitled "*Die Krankheiten des Rachens*," 1903, advises against the removal of enlarged tonsils in elder professional singers. *The larger the tonsil, the stronger his reasons for non-interference.*

Barth (University of Leipzig) says: "I do not remove normal or slightly hypertrophic tonsils (which do not cause pathological disturbances). If one wanted to do that one would have to perform in any normal man a number of prophylactic operations."

Loewenberg (Berlin) says: "I disapprove of operations upon normal tonsils in all cases."

Lermoyez (Paris) says: "I consider that the normal tonsils are organs that *must be respected*. One should never remove the human organs: not more a normal tonsil than a healthy tooth or a healthy eye!"

Sir Felix Semon (London) has constantly reiterated his views that "A thoroughly sufficient operation is by no means identical with 'complete

removal' of the gland. Tonsils can be *equally* well removed by very different methods. I consider total enucleation of the gland not only dangerous, but also generally superfluous."

Escat (Toulouse) states that: "It is not necessary, in my opinion, to set one's heart upon completely extracting all of the tonsillar tissue, as various American confreres proposed. The tonsil is not a cancer!"

Schiffers (La Presse Oto-Laryngologique, Belge, No. 7, 1910), says: "When it concerns the setting forth of therapeutic, and above all, of operatory conditions, it is necessary to consider the normal and pathologic state of an organ.

"Tonsillectomy is not imposed, and is not justified, except in cases of malign tumors of the tonsil."

Gleitsmann (New York) in an article on "*Treatment of Chronic Affections of the Tonsil*," *New York Medical Journal*, September 4, 1897;

Jacobi (Columbia University) in a monograph on the "*Phases in the Development of Therapy*," *Medical News*, November 4, 1905; and in an article on "*The Tonsil as a Portal of Microbic and Toxic Invasion*," *Archives of Pediatrics*, July, 1906;

Swain (Yale University), in a monograph on "*Are the Tonsils a Menace or a Protection?*" *Annals of Otology, Rhinology and Laryngology*, September, 1911;

Mackenzie (Johns Hopkins University) in his article on "*Abuses in Intranasal Surgery*," *New York Medical Journal*, January 28, 1905; and again in his monograph on "*The Massacre of the*

Tonsil," Maryland Medical Journal, June, 1912;

are in line with the teachings of *Marage, Von Levinstein, Von Chiari, Barth, Sir Felix Semon, Escat, Schiffers, Loewenberg and Lermoyez.*

It's a monstrous thought that permits an intelligent and educated surgeon to destroy an organ of the human body, the physiology of which he does not know.

It's a fine thought of *Sir Morell Mackenzie*, when he says: "All I claim for science is a right of *veto* against methods which are physically hurtful."

Methods of practice that have no foundation, no bottom, no authority, are generally hurtful.

Marage, Von Levinstein, Von Chiari, Barth, Sir Felix Semon, Escat, Schiffers, Loewenberg, Lermoyez, Gleitsmann, Jacobi, Mackenzie and Swain are men of great practical experience. They *pick* their cases and *select* their treatment. They are great authorities. They oppose the routine enucleation of the tonsil. And routine enucleation is also opposed by the entire voice profession.

Upon what foundation, what bottom, what authority, rests the practice of enucleation? I have sought assiduously for information.

Charles M. Robertson (Chicago) in *The Journal of the American Medical Association*, August 28, 1909, says: "If the tonsil in a *normal* state is removed *in toto* there is no disastrous after effect. On the contrary, the individual is improved in health."

This plea for the destruction of a natural

human organ stands alone! unparalleled in the annals of medical literature.

Operators who remove the tonsils as a matter of routine, generally deny to these organs any useful function. They are willing to destroy possible values, of which they admit they are ignorant. On the contrary, I have presented the evidence of men who attest the value of the tonsils, and with their knowledge, they refuse to destroy these organs.

It is no doubt true that every organ has some physiological function.

Before permitting the tonsil to be removed, absolute proof should be demanded that the disease which affects the organ cannot be cured by some reasonable method of treatment. Enucleation is not a method of treatment. Tonsillectomy is destruction. And destruction is not treatment. Ordinary scientific acumen will resent a general treatment for the varied affections of the tonsils. You have no right to enucleate an eye for a simple disease of the cornea, nor on the occurrence of strabismus. Neither have you any right to enucleate a tonsil just because one or two of its follicles are diseased. The principle is the same.

A correct differential diagnosis; a positive determination of etiologic and pathologic factors are essential to a reasonable prognosis and a sound method of treatment. There should be principles of treatment to govern the therapy of the tonsil. The principles may apply to (1) Primary Affection; (2) Secondary Affection; (3) General

Affection; (4) Reflex Affection; (5) Mechanical Affection; (6) Hyperplastic Affection.

(1) *Primary Affection.* Starts in the mouth, and affects chiefly the fossulae. Requires free exposure of the fossular surface, drainage, and hardening treatment to render the surface more resistible to bacterial irritation. The whole tonsillar surface may require treatment to make it more resistible; aerosuction, galvano-cautery, sterilization, etc.

If the tonsil has a protective physiological function, then it is a scientific blunder to enucleate the organ. It has not been proved that the tonsil has not a protective function.

If the tonsil has a protective function, and the organ becomes diseased, then we should save as much as possible of the tonsil that we may save as much as possible of its function.

(2) *Secondary Affection.* Arises via the lymphatic channels, chiefly from the nose. If the infection is thus secondary, via the lymphatic channels, then the tonsil should not be enucleated, but the disease in the nose requires treatment.

(3) *General Affection.* Occurs via the blood, and is symptomatic of general blood disease. The infection of the tonsil from the blood, *Fränkel* states, has not received the consideration which it deserves. If the infection of the tonsil is symptomatic via the blood vessels of general blood disease, then the tonsil should not be enucleated, but the disease of the blood requires treatment.

(4) *Reflex Affection.* Frequently associated

with dental caries, disease of the gums about the necks of the teeth, etc.

Reflex affections of the tonsil have never been considered by medical writers.

If the disease of the tonsil is reflex from dental caries, etc., then the tonsil should not be enucleated, but the teeth should be treated.

(5) *Mechanical Affection.* This form of affection is common among voice users and has so far met with little or no consideration by medical writers. If the tonsil is diseased, or enlarged through mis-use of the voice, then the organ should not be enucleated, but the voice should be treated by a voice specialist or voice trainer.

What should a parent do, with a child whose tonsils are troublesome, or enlarged?

He should obtain the advice of an experienced physician, of one who is able and willing to make a thorough, discriminative diagnosis to ascertain whether the trouble with the tonsil is a primary affection, secondary, symptomatic, reflex, mechanical or hyperplastic; of one who, *after having learned the character* of the trouble, will *then do enough investigating to learn the special cause in the particular case in hand*, whether it arises from disease or discharge in the nose, or disease in the blood, or bad teeth, bad gums, bad stomach, etc., which cause, upon receiving proper attention, will probably cure the tonsil trouble.

What should an adult do when his or her tonsils are troublesome or enlarged?

He or she should seek a physician who is old enough and conservative enough to be familiar with all the causes that lead to tonsil affections,

and who is both able and *willing to remove the cause* and remedy the trouble.

What should a voice user do, whose tonsils give trouble?

Singers, public speakers and teachers must be exceedingly cautious in what they do. Think well before doing anything, and then, be conservative. Go to the experienced laryngologist, go to the singing master, go to the teacher of elocution, consult these three, they go together.

I have given you the evidence of *Von Chiari*—*there is no higher medical authority*—that “greatly enlarged tonsils in elder professional singers should NEVER be removed.”

I have given you the testimony of *LamPERTI*—*there is no higher singing authority*—that “in almost all cases, in the fifty years of his teaching, after removal of the tonsils the voice is injured, often beyond remedy.”

I have given you the evidence of *Sebastiani*, “that if excision is of use in cases of hypertrophy to avoid greater damage, it may be of some benefit to the voice in general, but to specialized organisms, endowed with exceptional and valuable voices, then, in these uncommon conditions any surgical operation whatsoever, it matters not how perfect, can harm the precious instrument.”

The choice of treatment must *always* be deliberate, and always *exactly* fitted to the *precise* requirement of *each and every* patient. He who does not, or who cannot, make a definite diagnosis, deserves to be eliminated from consideration as an expert in scientific and artistic laryngology.

Enucleation of the tonsil is not a method of treatment. Enucleation is destruction. To destroy is not to treat.

If the tonsil has any physiological function; if it has an internal secretion, as suggested by *Masini* and *Shurly*; if it has a secretion valuable to health of the organism, and favorable to the growth of the skeleton, as taught by *Allen* and *Escat*; if it possesses the function of phagocytosis, as claimed by *Metchnikoff* and others; if it is a lymphatic node, a lymphatic filter for nasal secretions, as proved by *Von Lénárt* and others; if most diseases of the tonsil are secondary to infections in the nose, as accepted by *Fränkel*, *Von Levinstein* and others; if diseases of the tonsil are sometimes symptomatic of constitutional blood diseases, as all authorities admit; if diseases of the tonsil are sometimes due to reflexes from dental caries, etc.; if the tonsil is sometimes diseased, and enlarged, from mis-use of the voice, as taught by *Van Baggen*, *Escat*, *Castex*, *Miller*, *Garcia*, *Tosi*, *Rice* and others; if it is essential in contributing to the good singing tone, as claimed by *Lamperti*, *Mme. Cappiani*, *Bispham* and others; if its removal always impairs the singing voice, as declared by *Loewenberg*, *Sebastiani* and others; if it is a buffer organ as *Mme. Cappiani* thinks; if it has mechanical functions, then, under any of these circumstances, the needless destruction of the organ is a surgical blunder.

Before permitting the tonsil to be destroyed, please REMEMBER that it is a natural organ, possessing a normal histologic structure which the microscope can positively determine; that this

tonsil has many features not possessed by any other body in *Waldeyer's* lymphatic ring; that no lymphatic sinuses exist around the tonsil; that the immediate neighborhood of the tonsil is inferior in regard to facilities for absorption to the pharynx at some distance; that the tonsil, in a normal condition, as *Hodenpyl* proved, absorbs neither liquid, nor solid particles, from the oral cavity; that in cases of diphtheria where the membrane is limited to the tonsil, *Jacobi* has repeatedly proved that there is very little, or no, absorption of the toxin; that the external deep surface of the tonsil is encased in a fibrous sheath containing muscular fibres derived from the superior constrictor of the pharynx; that the tonsil contains a system of closed lymphatic canals, which do not open into connective tissue, as proved by *Retterer*, *Krause*, *Labbé* and *Von Levinstein*; that *Von Lénárt* has proved the existence of a direct communication between the lymphatic vessels of the nose and of the faucial tonsils; that *Von Lénárt* has also shown the existence of an intimate connection between the two faucial tonsils; that *Poli* states that the lymphatic regions of the two nostrils communicate with each other by anastomotic branches which at the back surround the free edge of the septum and at the front, though to a less degree, by vessels which pierce the septal cartilage; that the tonsil is peculiarly situated amidst a framework of active muscles.

THE VOICE PROFESSION must bear in mind the teaching of *Von Chiari* that the removal of the enlarged tonsils in elder professional singers permanently injures the voice; that *Richard Loewen-*

berg knows of cases in which the removal of normal tonsils has caused permanent detrimental effects to the voice, and that he knows of no case in which a singer's voice was improved, and that he disapproves of the removal of normal tonsils in all cases; that *Lamperti*, *Mme. Cappiani*, *Van Baggen*, *Hubbard*, and *Bispham* state that the removal of the tonsil interferes with the modulation of tone; that *Sebastiani* states that, while excision, in cases of hypertrophy, *may be* of some benefit to the voice *in general*, *it may be of no benefit to specialized organisms endowed with exceptional and valuable voices. But in these uncommon conditions—specialized organisms with exceptional and valuable voices—any surgical operation whatsoever, it matters not how perfect, can cause harm to the precious instrument*; that *Sebastiani* and *Mme. Schumann-Heink* declare that after enucleation the voice has been *damaged and sometimes entirely lost*; that *Shakespeare* reports pupils *whose voices suffered* from faulty operation; that *De Reszke* knew of *only one case* among all his pupils in whom the tonsils were removed; that *Van Baggen* advised the removal of tonsils in *only two cases in eight years*; that *Sabatini* has *only twice* ever recommended the operation; that *Mme. Lilli Lehmann* and *Mme. San Carola* advise *against the removal of anything from a singer's throat*; that *Garcia*, *Mme. Viardot-Garcia*, *Lamperti*, *Mme. Cappiani*, and *Mme. Von Klenner* vigorously object to any operation on the tonsils simply to improve the voice; that *Lamperti*, *Loewenberg*, *Mme. Cappiani*, *Mme. Mott*, *Sir Charles*

Santley, Mme. Von Klenner, George Sweet, Charles A. Rice, Mme. Nordica, Mme. Tetrazzini, Mme. Schumann-Heink, Mme. San Carola, Miss Cecelia Winter, Bonci, Bispham, Hubbard, Townsend, Taylor, have never known of a case in which the singer's voice was improved after the removal of normal tonsils; that Loewenberg, Lamperti, Sebastiani, Shakespeare, Mme. Cappiani, Mme. Mott, Mme. Von Klenner, Mme. Schumann-Heink, Mme. Everett, Bispham, Hubbard, and Taylor have known of cases in which the voice was impaired after the removal of the tonsils; that the statements of Morell Mackenzie, Lennox-Browne, Emil Behnke, and Gordon Holmes, that Mme Patti's tonsils were removed and that her voice was improved thereby, are flatly contradicted by Mme. Patti; that the tonsils assist in the mechanism of the voice, as taught by Lamperti, Mme. Cappiani, Van Baggen, Hubbard and others; that the removal of the tonsils interferes with the voice mechanism; that all voice authorities are opposed to the removal of the normal tonsils; that after removal of the tonsils the voice is often impaired beyond remedy (Lamperti); have always found a lack of sweetness in the tone quality—and difficulty in supporting the tone in certain registers (Mme. Von Klenner); voice is damaged and sometimes entirely lost (Sebastiani).

Don't forget that the tonsil is a natural organ; that you have no right to destroy a natural organ; that the physiologico-biological values of the tonsil have not been proved; that by enucleation you destroy values of which you have no knowledge;

that the tonsil has important mechanical functions, a buffer, a cushion, a fulcrum, a compensator; don't forget the teaching of *Fränkel, Von Levinstein, Brieger, Görke, Grober, Escat* and *Marage*, that you have no authority to destroy the tonsil, that you should cure it; *don't forget* the assertion of MacBride that more than half the people who do not complain have some abnormality which should not be operated upon without complaint; *don't forget* that *Frederic Young* found all prima-donnas with extraordinary voices had big tonsils; *don't forget* that among 8,000 pupils examined by Neustaedter, tonsils are largest in the best pupils, and that the best singers have fifty per cent more tonsils than the poorest; *don't forget* the statement of *Jacobi*, that so many operations on the tonsils would not be necessary if the nose were kept clean; *don't forget* that *Semon, Mackenzie* and all other conservative authorities, deplore the disastrous effects of intemperate surgery; *don't forget* that patients are often scared into operations; *don't forget* that many patients, who could just as well be operated on in the physician's office, or at their own home, are needlessly sent to hospitals; *don't forget* that the object of surgery is the restoration of physiological function; *don't forget* that hunger dulls the school child's mind; *don't forget* that tonsillectomy is an American operation; *don't forget* that *tonsillotomy is preferred to tonsillectomy*, by such skilled American operators as *Gleitsmann, Mackenzie, Miller, Gleason, Grayson, E. L. Shurly, Swain, Ross* and *Farlow*; *don't forget* that tonsillectomy is never performed by *Price-*

Brown, Miller, Gleitsmann, Grayson and Jacobi; don't forget that tonsillectomy is never done by Von Chiari, Fränkel, Brieger, Von Levinstein, Escat, Marage, Lermoyez, Moure, Grober, Semon; don't forget that enucleation as a routine operation is opposed by Lack, Syme, Semon, Mackenzie, Gleitsmann, Gleason, Grayson, Shurly, Swain, Miller, Ross, Brown, Farlow, Jacobi, Von Schrötter, Loewenberg, Von Chiari, Fränkel, Brieger, Goerke, Von Levinstein, Escat, Castex, Marage, Lermoyez, Moure, Barth, Gerber, Grober, Haymann, and Schmiegelow. Don't forget that the lingual tonsil sometimes overlaps and blends with the lower part of the faucial tonsil, as stated by Escat.

Don't forget that: "Inferiorly the faucial tonsil becomes merged in the border of the tongue, blending with those closed follicles which are scattered about at this level, and which are known as the lingual tonsil." (Moure.)

Don't forget Von Levinstein: "Complete enucleation of the faucial tonsil is an impossible operation."

Don't forget Grober: "It is not possible to remove the tonsil entire."

Don't forget Brieger: "The total removal of the tonsil is not possible."

Don't forget Escat: "Even in the most radical ablation of the tonsil, there is always left a little adenoid tissue."

Don't forget Marage, who states that "tonsil tissue cannot be wholly removed."

Don't forget John N. Mackenzie: "The so-

called complete enucleation—the chief objection to which is that it can never be made complete.”

Don’t forget Von Levinstein: “Adenoid tissue is continually regenerated.”

Don’t forget Brieger: “When cut out the tissue grows again.”

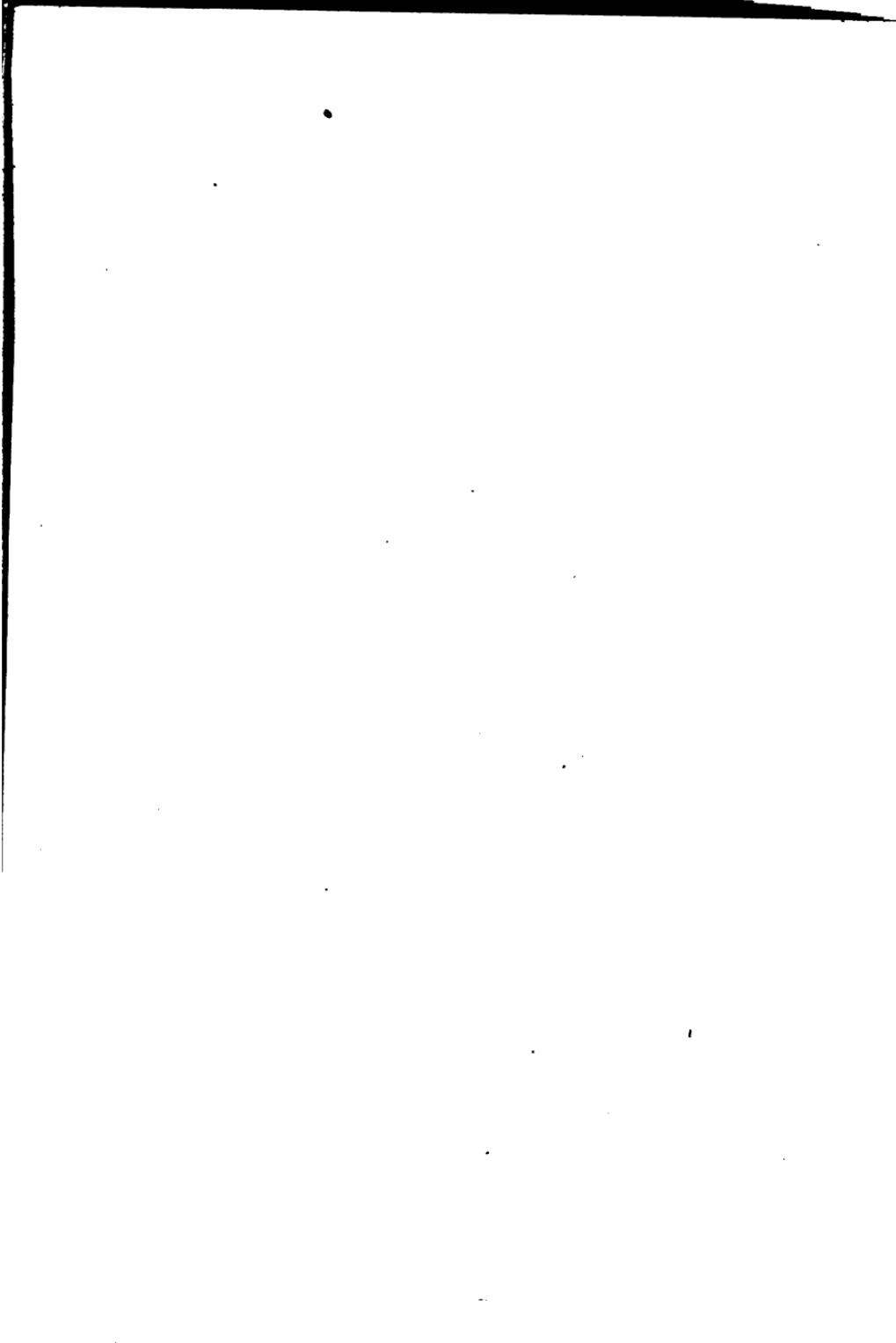
Don’t forget Goerke: “After operations the tissue regrows.”

“The adenoid tissue regenerates in all cases after removal of the tonsils. Those same causes which led to the first hyperplasia, also lead to the new. These recurrences occur more often than we think, but we do not know about them. Patients don’t speak about the return, because they don’t want to be operated on again. The regrowth is never as great as the first hyperplasia.”

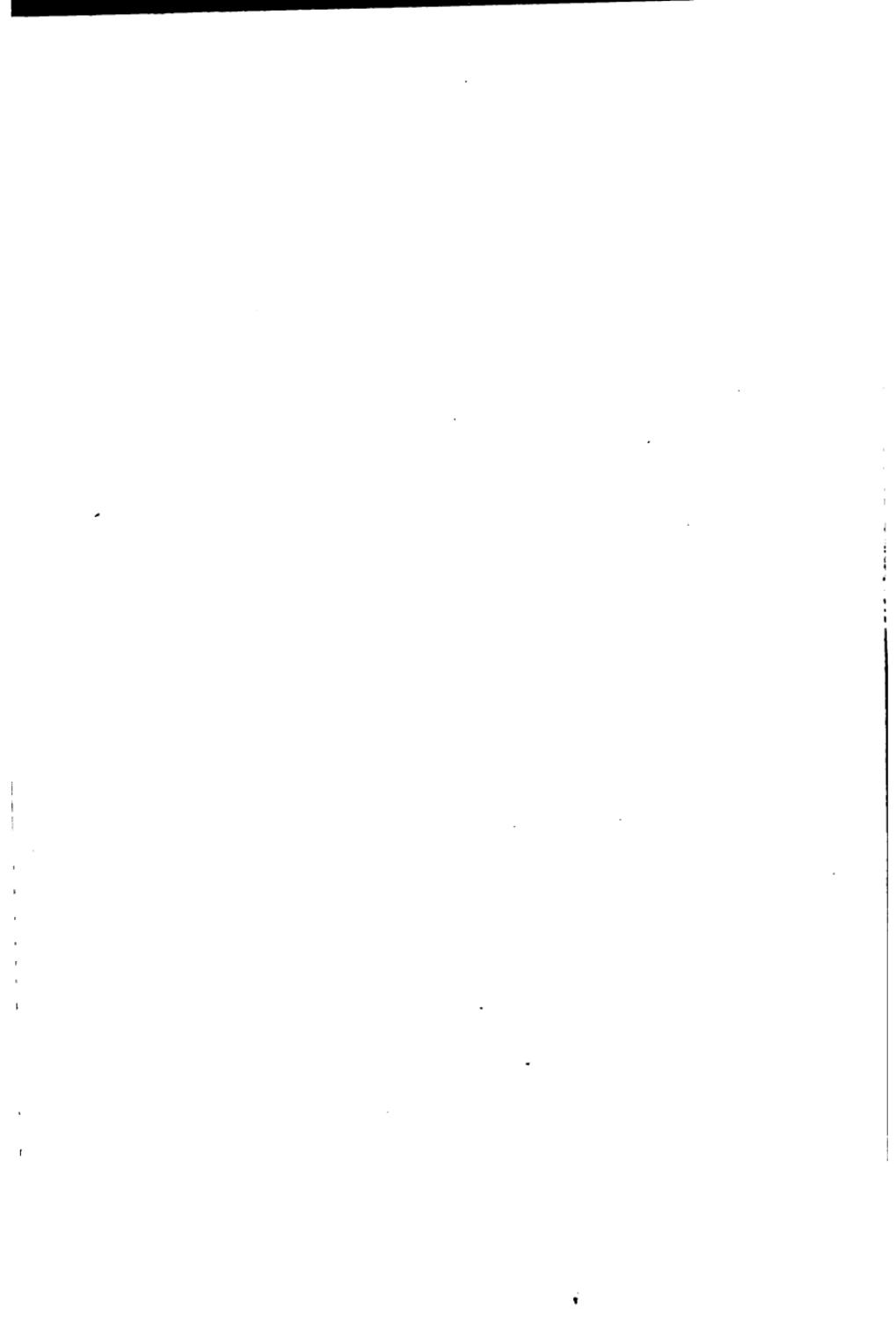
Based upon the observations of Von Levinstein, Brieger, Goerke, Grober, Escat, Moure, Marage, and Mackenzie, the so-called “complete enucleations” must hereafter be viewed as mere tonsil-lotomies.

Freely admitting the great improvement in the general health that occasionally follows the so-called “complete” operation, may we not justly consider that in all such cases, enough tissue has remained after the operation, as Escat distinctly claims, to perform the function of the tonsil?

And finally, is it not highly probable that the benefit obtained is in direct proportion to the amount of tonsillar tissue which remains after the operation?











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